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An Indian Railroad Commissioner in America.

Mr. Thomas Robertson, Special Commissioner for Indian Railways, has recently spent a day or two in New York, and will probably have sailed for England by the time this note appears. Mr. Robertson is a British railroad officer of very large experience and has a high reputation for organizing and management. He was asked by the British government to take up the great question of the administration and working of the railroads of the Indian Empire. This is a pretty big job, for it covers over 25,000 miles of railroad and 1,560,000 sq. miles of territory.

Mr. Robertson has been some three months in the United States, making thorough studies of various aspects of railroad organization, construction, equipment and working. Before this he had been some time in India, making similar studies. His commission is to report to the Indian government plans and recommendations for any changes in construction, equipment and operation which will improve the railroad conditions in that country.

Probably no reasonable man would expect Mr. Robertson to have found in this country any one specific thing which can be transplanted unchanged to India, or which, if so transplanted, would greatly improve railroad conditions there. Such changes as Mr. Robertson may suggest, and may be the means of bringing about, will embody the results of experience and observation for many years and in many lands, and his American visit can only be a part of this general educational process. Specifically, however, we may say that his observations of the working of cars of great capacity in this country, will probably result in the introduction of some cars of that sort in India; but Mr. Robertson is not at all satisfied that even in this country cars of 50 tons capacity, or even 10 tons capacity, are economical or efficient for general traffic. There is in India a large movement of coarse and heavy staples, and in such movement heavy cars will doubtless be found economical. Furthermore, it is quite impracticable to make any sweeping and general change in the character of the great mass of the rolling stock, both for physical and financial reasons. The introduction of the heavier cars and the disappearance of the lighter ones must be a gradual process.

Mr. Robertson was a good deal struck with the great study of back loading by the most enlightened managers in this country, and it is probable that something of his observation of our practice in that matter will appear in his report to the Indian government.

From conversation with Mr. Robertson we should gather that the weakness of the Indian railroad management is fundamental. In this we do not quote his words and possibly we do not convey his ideas quite accurately. We infer that the weakness is inherent in the system, and it will never be greatly changed until the system itself is radically changed. That is, an important mileage is worked directly by the State, and the State control of the guaranteed and assisted roads worked by companies is strict. It does not require much experience or much imagination to appreciate the evils that arise. Any man

of observation must have learned that the bureaucratic methods inseparable from State management, are just the methods that should not be used in railroad management. In India estimable and able men, but men without long and comprehensive training, are constantly put in the position of being obliged by their duty to criticize and suggest in railroad management, and frequently even to direct and administer. The system of advancement from grade to grade is strictly by seniority, with the result that a man who can do admirable work in one place finds himself out of place somewhere else. The constant impulse to economy and to creating new movement which underlies private management for profit, is lacking in State management. We all know that humanity loves to take things comfortably, and dislikes violent changes, and this is especially true as men grow older. Running all through the working of the Indian railroads will be found the spirit of satisfaction with existing conditions, opposition to changes, a feeling of want of direct personal responsibility for results, a readiness to refer any question to a superior for decision, comparative indifference to the development of the traffic of any town or region, and, in brief, all the familiar weaknesses of bureaucracy.

In saying these things it must be remembered we are not quoting Mr. Robertson, but expressing the thought which, perhaps, we read into his words.

One change which Mr. Robertson hopes to see brought about, and which seems not only reasonable but highly desirable, is to connect up the narrow gage system of the North with the narrow gage system of the South, by building about 700 miles of new line in Central India. This new line would be laid across territory not now served by railroads. One of the means of efficiency and economy to come from such a new line would be the possibility of transferring the rolling stock from the North to the South and back again. The seasons of heavy traffic differ by about two months, and at present there is a great amount of rolling stock deteriorating in the sheds and on the side tracks in the slack season, and a serious shortage of rolling stock during the busy season. Obviously, an important improvement could be made were this rolling stock readily transferable from one part of the country to the other. We should suppose that beyond this there would be a considerable military advantage in such connection of the two systems.

It seems probable that train speeds may be advantageously increased, particularly in the freight traffic. Here time is wasted by irresponsible trainmen, who are permitted to dally along the road, and reduce the average movement of freight trains over long distances sometimes to as little as a mile an hour. They lie up on sidings and cook and eat their meals, and sleep comfortably, and apparently pull out at their own convenience.

It seems probable, further, that much might be done to increase the volume of passenger movement among the natives by still further diminution of rates in certain districts: although, as we recently pointed out, the passenger movement per mile of line is already very dense, and the passenger rates considerably the lowest in the world.

Mr. Robertson spoke with admiration of the sagacity of Lord George Hamilton, Secretary of State for India, and especially of Lord Curzon, the Viceroy, who has displayed an extraordinary grasp of the affairs of India, who is fully conscious of the overwhelming importance of the railroads in maintaining and building up that Empire, and who is carrying on his work with devoted and self-sacrificing zeal.

One Cause of Leaky Flues.*

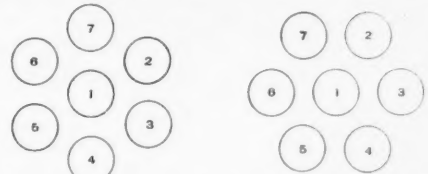
It will doubtless be admitted by all who have had personal experience with locomotive flues in bad water districts, that the causes of leaky flues are numerous. Those who have not had the rather doubtful pleasure of reading detention reports in which the cause is given as "leaky flues" are, I believe, largely in the minority in this section of the country. Of course the primary cause is bad water. Were this removed, our troubles would be practically at an end. The mileage made by a set of flues varies much at places within even 200 miles of each other. Yard engines in one of our yards averaged during the last five years, between flue settings, 17,475 miles; at another yard less than 200 miles distant from the first, the average mileage for the same period was 41,278 miles. The water at the first yard averages about 36 grains of scale making material per gallon; at the second one about 14 grains.

It is very difficult to show by figures that it is cheaper from a motive power standpoint to purify the water than to reset flues. When I say purify, I mean to reduce the scale making material in the water to about three grains per gallon by chemical means, and before the water is put into the locomotive tank, although this is, in the opinion of those who have carefully studied the subject, the only proper way to get good water. The most of us are unfortunate in not having a pure water supply, or water that has been purified.

The committee appointed by the Master Mechanics' Association, and which reported in 1901 on the subject of "The most satisfactory method of handling, cleaning and setting boiler tubes," found that the practice of 27 roads was practically uniform as far as setting the tubes was concerned. There was one point brought up which

did not receive the attention which I think it should. There was one other point which was referred to indirectly, but which did not attract any attention. The first of these points is in regard to the roundness of the holes in the flue sheet; and the second one is in regard to the shape of the section of the hole. There will be no argument, I believe, against a round hole; as to whether it should be cylindrical, there are differences of opinion. Now, it is very expensive to ream the holes in a flue sheet as soon as they become slightly out of round. The width of the bridge between the flue holes would become too small and it would be necessary to apply a new flue sheet, which takes both time and money.

The question recently arose on our road as to when the holes in the flue sheet should be reamed. The opinions of those interested varied materially; the extremes being $\frac{1}{64}$ in. and $\frac{1}{8}$ in. out of round. In other words, one would ream the holes when there was $\frac{1}{64}$ in. difference between the long and short diameter of the holes, and the other would wait until this difference became $\frac{1}{32}$ in. My personal opinion was between the two. After considering the subject carefully, I thought that $\frac{1}{16}$ in. difference between the diameter would do no harm. It became necessary, of course, to get some facts bearing on this matter and we made several tests to determine what the action of the tools ordinarily used in setting flues had on the flue sheet. A careful examination of a large number of flue sheets shows that in every instance the holes in the upper corners of the flue sheets are oblong. In one case, there were seven holes $\frac{3}{32}$ in. out of round, 11 $\frac{1}{16}$ in. out of round, 37 $\frac{1}{32}$ in. out of round, 54 $\frac{1}{64}$ in. out of round, and 34 were round. This flue sheet was not in bad condition and the flues could have been reset and would have given very good results since the holes that were badly out of round, were in the upper corners as above stated, while the holes that were true were in the bottom center part of the flue sheet, where flues always give trouble first. We reamed the holes in this sheet and again carefully measured them, to see if there was any spring in the sheet which would cause them to become oblong after they had been reamed. We failed to find any evidence of any such action. We then selected two holes, one in the center of the sheet and one in the upper left hand corner. In these we set flues, following our regular practice. The flues were then cut out, and the holes again measured. The dimensions are given in the table, of the holes immediately next the center hole in which the flues were rolled, which holes are numbered "I," the other holes following in regular rotation.



Tests 1, 2, 5 and 6.

Tests 3 and 4.

Test No. 1 is the case in the upper left hand corner of the sheet, and Test No. 2, the one in the center of the sheet. It will be seen from these tests that while the holes were originally round, yet the work of setting the flue has made a difference in some cases of $\frac{3}{1000}$ in.

We next took a flue sheet in which the holes were oblong, and made the same tests as above, except that all the holes were measured, first while the flue was in place, so that the diameter of hole No. 1 in the second column is the inside diameter of the flue after rolling, and second, that the holes were again measured after the flue was cut out and the piece of the sheet enclosing the seven holes, sheared out. It will be noticed that the difference between the long and short inside diameter of the flues is less than the difference between the same

No. of hole.		Before setting.		With flue in.		After removing flue.	
		Long.	Short.	Long.	Short.	Long.	Short.
1	1	2.09	2.09	.....	.....	2.09	2.07
	2	2.07	2.07	.....	.....	2.08	2.06
	3	2.64	2.56	2.34	2.29	2.65	2.56
	4	2.55	2.48	2.20	2.17	2.59	2.54
	5	2.53	2.51	.....	.....	2.55	2.53
	6	2.58	2.55	.....	.....	2.58	2.55
2	1	2.09	2.09	.....	.....	2.10	2.07
	2	2.07	2.07	.....	.....	2.06	2.06
	3	2.64	2.63	2.66	2.63	2.64	2.63
	4	2.56	2.53	2.58	2.55	2.58	2.55
	5	2.56	2.51	.....	.....	2.58	2.51
	6	2.59	2.56	.....	.....	2.59	2.55
3	1	2.09	2.09	.....	.....	2.09	2.09
	2	2.07	2.07	.....	.....	2.09	2.06
	3	2.58	2.56	2.58	2.55	2.58	2.55
	4	2.58	2.56	2.59	2.56	2.59	2.56
	5	2.55	2.51	.....	.....	2.56	2.50
	6	2.58	2.56	.....	.....	2.56	2.56
4	1	.....	.....	.....	.....	.....	.....
	2	.....	.....	.....	.....	.....	.....
	3	2.64	2.56	2.63	2.56	2.63	2.56
	4	2.61	2.56	2.59	2.56	2.59	2.56
	5	2.53	2.50	.....	.....	2.53	2.51
	6	2.59	2.56	.....	.....	2.56	2.55
5	1	2.09	2.09	.....	.....	2.10	2.09
	2	2.07	2.07	.....	.....	2.10	2.09
	3	2.66	2.59	2.63	2.58	2.64	2.59
	4	2.56	2.51	2.55	2.55	2.56	2.53
	5	2.53	2.53	.....	.....	2.53	2.51
	6	2.56	2.53	.....	.....	2.53	2.53
6	1	2.09	2.09	.....	.....	2.09	2.07
	2	2.07	2.07	.....	.....	2.07	2.06
	3	2.64	2.63	2.63	2.63	2.64	2.63
	4	2.56	2.48	2.55	2.47	2.58	2.50
	5	2.55	2.51	.....	.....	2.55	2.51
	6	2.56	2.53	.....	.....	2.56	2.51
7	1	.....	.....	.....	.....	.....	.....
	2	.....	.....	.....	.....	.....	.....
	3	2.63	2.61	2.61	2.59	2.61	2.61
	4	2.58	2.55	2.56	2.56	2.55	2.55
	5	2.55	2.51	.....	.....	2.55	2.51
	6	2.59	2.53	.....	.....	2.58	2.53

*A paper presented at the September meeting of the Western Railway Club by I. W. Miller, Master Mechanic of the P. C. C. & St. L. Ry., Indianapolis, Ind.

diameters of the holes in which they were set, showing that the flue setting tools will take care of quite a little variation in the diameters of the holes in the flue sheet. It also appears that there is some stress produced in the flue sheet by expanding the flues, which is partly relieved when the piece in which the flue has been set is cut out. These are Tests 3 and 4.

We made two more tests to confirm the above results in still another flue sheet, results of which are given in the table under Tests 5 and 6. It was also found that the direction of the long diameters frequently changed, and that the flue sheets move in an irregular manner under the influence of the expanding tool. The general tendency, however, is for the holes in the upper corners to become oblong, the long axes being parallel to lines drawn from the top center of the flue sheet at an angle of 45 deg. below the horizontal.

As above stated, flues in the upper corners, even those set in oblong holes, give very little difficulty from leaking, while those in the center and bottom of the flue sheet, are the ones that cause the trouble even although they are practically round. An examination of a large number of flue sheets showed that the holes in the bottom center part of the sheet, while they were round, or nearly so, were not cylindrical; in other words, the diameter of the hole next to the fire-box being from $\frac{1}{16}$ in. to $\frac{3}{64}$ in. larger than on the side opposite. Neither were the holes conical, but of irregular shape. Upon looking over the records and questioning everybody concerned, it developed that the engines which had given the most trouble from leaking, had the worst holes in this respect. This appeared then to be the key to the difficulty, and in searching still further, it was found that the trouble was caused in all probability, by the use of taper mandrels or drifts, which being forced into the straight holes in the flue sheet, temporarily stopped the leaking, but permanently injured the flue sheet. These, of course, were removed as soon as it was discovered that their use was detrimental, and the Prosser expander substituted. A noticeable improvement was found almost at once.

It would appear from the above tests and experiments, that it is useless to ream a hole in a flue sheet which is less than $\frac{1}{16}$ in. out of round, provided it is cylindrical, but, if there is over $\frac{1}{32}$ in. difference between the diameters at the two sides of the sheet, that the hole needs reaming, even although it is round. I do not claim that attention to these two points will stop the trouble from leaky flues, but I know that by watching them carefully, and reaming the holes at the proper time, our trouble will be reduced and I believe without any decrease in the life of the flue sheet.

Locomotive and Car Scrap.*

The economical assortment and disposition of scrap at locomotive and car shops has been pursued on widely varying plans. One of the most primitive methods is to bring the scrap to some convenient place and throw it unassorted on the ground. It is then assorted when loaded for shipment to purchasers. It is wheeled to the cars in barrows and lifted up to the floor by "main strength," and laborers in the car transfer it by hand and wheelbarrows to ends of car.

To supplant such methods a scrap bin was constructed, several years ago, which may prove of interest to describe. The half-tone and drawing which accompany this article show the bin as constructed. In it is handled the scrap from the locomotive and car departments of a road having 140 engines and 11,000 cars, and making monthly shipments of scrap.

The scrap bin has a length of 258 ft. and a width of 40 ft. The floor is on a level with box car floors. The bins are 6 ft. high by 30 ft. long; the width of bins vary from 24 ft. to 6 ft., according to quantity of scrap to be stored in them. The bins and supporting structure were made from old car sills at a cost of \$700 for material and labor.

The classification of scrap and capacity of bins are as follows:

	Capacity in tons.		Capacity in tons.
No. 1 wrought iron.....	250	Soft steel.....	60
No. 1 cast iron.....	300	Iron and steel punchings.....	70
Tank sheets.....	30	Staybolts and lined iron.....	70
Light sheets.....	30	Brass skimmings.....	45
Boller steel.....	45	Brass ashes.....	30
Elliptic springs.....	50	Cast steel.....	90
Coll springs.....	60	Sacks, rope and hose.....	26
Flues.....	30	Mixed turnings.....	30
Flue clippings.....	30	Cast iron turnings.....	50
Gas pipe.....	20	Wrought axle turnings.....	30
Journal boxes.....	60	Steel turnings.....	50
Burned castings.....	60	Brass turnings and brass scrap.....	49
Malleable castings.....	50		
Channel bars.....	30		

When a carload of scrap accumulates at any point on the road, it is shipped unassorted to the scrap bins at main shop. At the car repair yards the scrap is picked up, unassorted, and placed on a car, which is run down the repair track for that purpose. When the car is loaded it is then taken to the scrap bins. The scrap is assorted as it is taken from the car and loaded in barrows and taken to the proper bins.

It was found important that the scrap bins should be in charge of a man familiar with car construction, so that good second-hand material would be saved. In this plant an experienced car repairer has charge. The large number of different castings used in car construction,

made it necessary to have some one in charge, who was familiar with them.

It is truly a matter of astonishment what is found in scrap sent to the bins. New bolts, new washers, new castings, etc., are not infrequently sent to the bins with scrap material. Their presence there is due to the fact that car repairers order more material than is used on repairs of cars and this new material is gathered up with the scrap. It is sent back to the material bins for use. A large quantity of good second-hand material fit to be used again is removed from wrecked and from old cars. All good material of this nature is laid to one side and one man is engaged in wheeling this material to the casting pile, or material bins, to be used again. The foreman of the blacksmith shop visits the scrap bins several times a day and advises the man in charge what forgings can be used again. By this double system of inspection, all good serviceable material is saved. It amounts to thousands of dollars a year.

At one end of the scrap bin is a shed, 30 by 42 ft., where the shears operated by air pressure, for cutting off bolts, rods, etc., are located, and, near them, the bench of the "brake-beam industry." All damaged metal brake-beams are carried here and defective parts removed and good parts applied. Two damaged brake-beams will often make one good one without the use of new parts, but new parts are also provided and used when the second-hand parts run out of stock. After brake-beams are repaired they are taken to material platform in the car repair yard.

The great industry carried on in this shed, however,

eral visits each day to scrap bins, inspect contents of same and have set aside such material as he knows can be used to advantage.

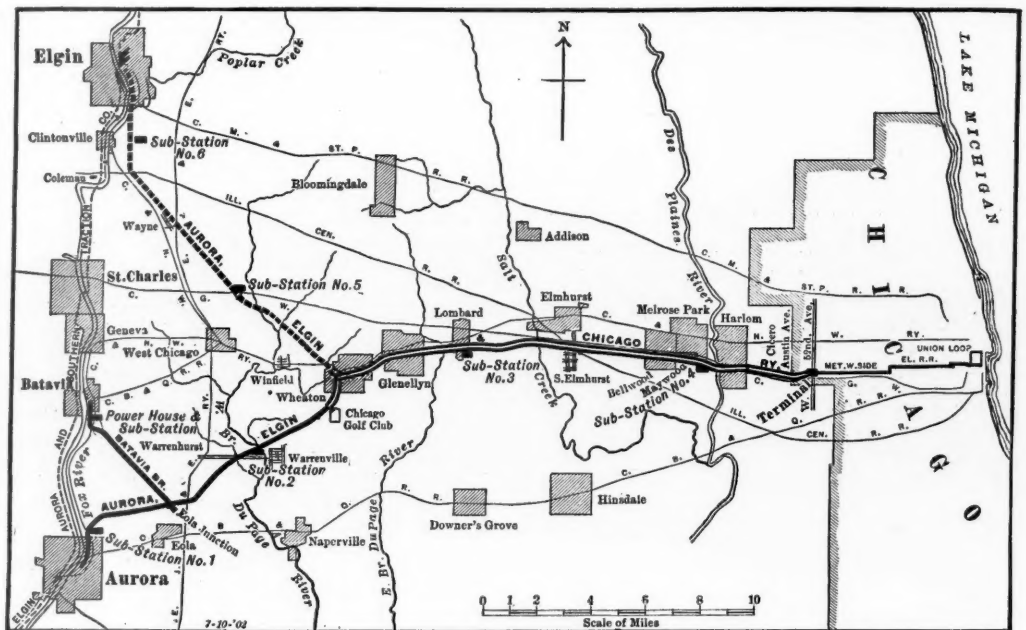
5. Good judgment must be used in regard to the working over of scrap materials; sometimes it costs more in the end than new material.

(The half-tone and drawing of bin referred to are not reproduced here.)

The Aurora, Elgin & Chicago Interurban Railway.

A good example of the numerous interurban electric roads that have been developed in the Middle West has recently been opened to service from Chicago westward through one of the most populous districts contiguous to that city. It is estimated that the district which this road, the Aurora, Elgin & Chicago, will serve either directly, or by connection with other interurban electric lines, has a population of 150,000. A map of the road showing the towns on the line, together with other electric and steam railroads occupying the same territory is presented herewith.

As will be seen from the map, the eastern terminus of the road is at Fifty-second avenue, Chicago, where connection is made with the Metropolitan West Side Elevated Railroad (Garfield Park Branch), by which passengers are carried to the heart of the business district in 26 minutes. There are, or will be, three western termini, Aurora, Batavia and Elgin, the first and last of which are cities of 30,000 population. From Fifty-second



Map of the Aurora, Elgin & Chicago Railway.

is that of making good bolts out of defective ones. If a bolt is not too badly rusted and has only a defective thread, it is cut off by the air shears, straightened by the bolt straightening machine and then placed in bins, located near shears, holding about a wheelbarrow load each. When needed they are taken to the bolt cutters and then to the material bins for future use. Old bolts have been utilized in this manner to the extent of 6½ tons per month. The saving in old bolts over the cost of new bolts amounts to \$80 per month.

Car coupler knuckles are inspected and all that are bent and not otherwise defective, are collected in lots of 100 and taken to blacksmith shop and thrown into a furnace. They are heated and straightened in a former, made in two parts, under a blow of the steam hammer. The cost to straighten knuckles is 5 cents each. If we assume that a knuckle is worth 47 cents as scrap, and after it is straightened it is worth \$1.66 as a good second-hand knuckle, deducting the cost of straightening, we have made a gain of \$1.14 per knuckle, amounting to \$68.40 per month.

Brass skimmings from the brass foundry were formerly sold to the highest bidder, each bidder taking a sample for examination before making a bid. In one instance after receiving a bid for this material it was dried and rattled in a flue rattler until the skimmings were cleaned. It was then sifted and the clean residue was melted and poured into castings. It was found that \$125 was saved by cleaning and using the metal instead of selling the brass skimmings.

In my opinion, the important points in constructing and operating scrap bins are as follows:

1. Scrap bin floors should be on level with floors of box cars.
2. The work of assorting scrap should be under the supervision of a man who has had experience in car repairs, that good material may be picked out and set aside for future use.
3. Shears for cutting bolts, a bolt straightening machine and a bench with vise should be installed.
4. The foreman of blacksmith shop should make sev-

avenue to the Chicago Golf Club, west of Wheaton, the road is double tracked, a distance of 21 miles. At Wheaton the line branches, one branch running northwest to Elgin, 16½ miles, and the other southwest to Aurora, 14½ miles, with a branch at Eola Junction running northwest to Batavia, 7½ miles. The total mileage of the line is 82 miles of single track counting sidings, of which there are seven. Two of these are 1½ and 1 mile long respectively, and the others are from 800 to 1,500 ft. The Elgin branch, which the map shows as being under construction, will probably be completed by December.

As the road was designed for high speed service the track and bridges are of the most substantial character and the curves and grades were laid out with careful consideration to the character of the service. The company owns its right of way, which for the most part is 100 ft. wide through this country, there being a few short stretches where this is reduced to 66 ft. The ownership of right of way also includes that in the towns, the only parts not belonging to the company being the street crossings and a half-mile of street in Aurora. The right of way is fenced, American Steel & Wire woven wire fencing being used, and every crossing is protected with Climax cattle guards. A third-rail system is used throughout, with the exception of the half-mile of city street in Aurora, where it is necessary to use a trolley.

The physical conditions which the engineers had in mind in designing the road have been referred to. The endeavor was to make the line as nearly straight and level as possible, and how nearly this object was accomplished is indicated by the fact that there are but two points on the line where the grades exceed 1 per cent, these being a 1.8 per cent. grade on the Batavia branch, where the line drops down to the power station, and a 1.2 grade on the Aurora branch. West of the Des Plaines River there are no curves exceeding 2 deg., and these are struck with long radii. East of the river conditions necessitated some sharp curving, the maximum of these being 6 deg. The line is gravel ballasted mostly, rock ballast being used at points where there are deep cuts or where there might be a tendency for the gravel

*A paper presented at the September meeting of the Western Railway Club by T. A. Lawes, Supt. Motive Power and Machinery, C. & E. I. R. R.

to wash away. The substantial character of the bridges is shown by the engravings. All spans of less than 60 ft. are built of concrete and steel, a gravel filling 12 in. deep being placed over the arch to preserve the flexibility of the roadway. The double-span concrete masonry bridge shown in the illustration has 35-ft. arches. It is interesting to note in this connection that a steam railroad bridge at this same point, a view of which is obscured by the concrete bridge, is a timber trestle, making more noticeable the character of structure used by the electric road. Another view shows the concrete cattle-

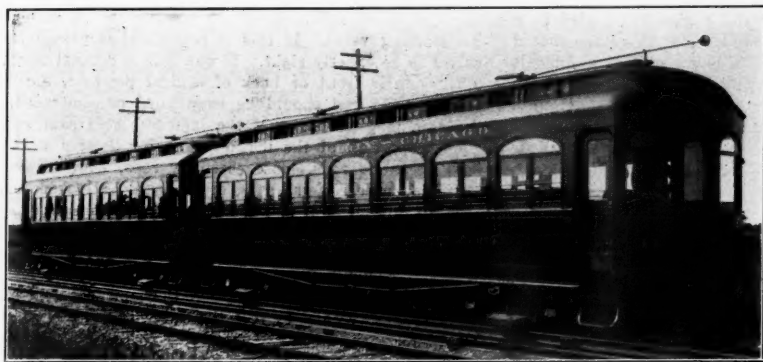
chutes. Other equipment includes McKenzie traveling grates, Green economizers and the necessary complement of feed and circulating pumps, as well as a vacuum pump and condensers.

The generating rooms will contain four generating units, two of which are in operation, and a third is now being installed. These units are composed of 2,200-h.p. horizontal cross-compound Corliss engines direct connected to 1,500-k.w. generators. The engines, which were furnished by the C. & G. Cooper Co., Mt. Vernon, Ohio, are 32 and 64 x 60 in., and run at 75 r.p.m. under an initial pressure of 150 lbs.; they are capable of standing a 50 per cent. overload. The generators are the General Electric Co.'s three-phase alternating current A-T-8 type, each phase having a rated output of 377 amperes at 2,300 volts, at a speed of 75 r.p.m. There are also two 125-volt, 160-kw. direct current units, engine driven, and a 300-kw., 125-volt generator driven by an induction motor, all for supplying current to the motors driving some of the pumps and other auxiliary apparatus. A 50-ton crane having two 25-ton

& Kilburn, and each car has a smoking compartment. They are mounted on Peckham high-speed No. 30 M. C. B. trucks, a complete illustrated description of which was given in our issue of Aug. 1. They are guaranteed to be satisfactory at a speed of 75 m.p.h. Each car is equipped with four G. E. 66 motors of 125 h.p. each, or 500 h.p. per car, geared to 70 m.p.h., and guaranteed to run at this speed either singly or in trains, the multiple-control system being used. The General Electric Co. is equipping two of these cars with the expectation of running at 100 m.p.h. or more, for the purpose of obtaining data on current required, etc., and also data on atmospheric resistance. In these experiments different forms of fronts will be used on the cars. The weight of each car complete is 72,850 lbs., and the equipment at present comprises 20 motor cars and 10 trailers.

The present schedule makes the time from Aurora to Chicago, 34 miles, 1 hour and 15 minutes. It is expected to reduce this to one hour, which will be the schedule time from all three western termini to Chicago. Also about the first of the year an express service will be put on which will probably have a schedule of 45 min. with but one stop, at Wheaton. When the line is in full running order there will be a train each way every 15 min. from Chicago to Wheaton, from which point they will run alternately to Elgin and Aurora, giving a half hourly service to these places. Likewise a half-hourly schedule will be maintained on the Batavia branch, making connection with the Aurora cars. The rates of fare are 50 cents single fare, or 90 cents for the round trip to the terminal points, with proportional rates for intermediate points.

The company is contemplating the use of a block-signal system on the double-track part of the road which will be automatic in action and will be operated by current from the third rail. The train despatching is done by telephone, and wires are strung for two telephone systems, one of which is for company business. There are telephone booths at all switches and cross-overs, as well as at the sub-stations, and each car carries a telephone.



Two-Car Train—Aurora, Elgin & Chicago.

passes put in for the accommodation of farmers and to avoid the risk of killing stock by the fast trains.

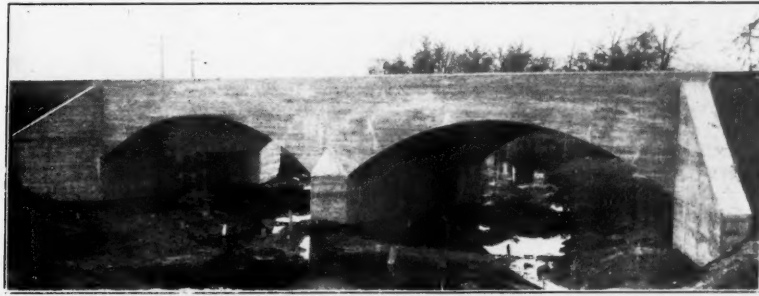
For the longer spans heavy steel plate-girder bridges are used. The longest of these is over the Des Plaines River, there being two 100-ft. double-track through spans. The west branch of the Du Page River has an 89-ft. through-girder span in conjunction with a 22½-ft. deck span. Other spans are deck or through-girder, as conditions require, including the overhead highway crossings.

hoists serves the engine room.

The water for the station is obtained from the Fox River, there being three chambers under the station in the concrete foundation, separated from each other by walls of concrete. The water passes through four screens placed in the two front chambers, these screens having meshes grading from ¾ to ¾ in. successively. From the two front chambers, which are side by side, it passes to



An Overhead Highway Crossing—Aurora, Elgin & Chicago.



Concrete Masonry Bridge Over Salt Creek—Aurora, Elgin & Chicago.

Where the Chicago & North Western is crossed by the Elgin branch a 150-ft. through-truss bridge is used. The abutments and piers for all of the bridges are concrete.

The track is laid with 80-lb. rails, 60 ft. long, the standard ties used being 6 x 8 in. by 8 ft., while every fifth tie is 6 x 8 in. by 9 ft., the insulators for the third rail being placed on this extension. The third rail weighs 100-lbs. to the yard and is of a special composition for purposes of conductivity, having 0.10 per cent. of carbon. The insulators have a malleable-iron base, above which is a collar of "Dirigo" insulation surmounted by a malleable cap, on which the rail rests. At crossings the third rail is broken, connection across the break being made by cables laid underground.

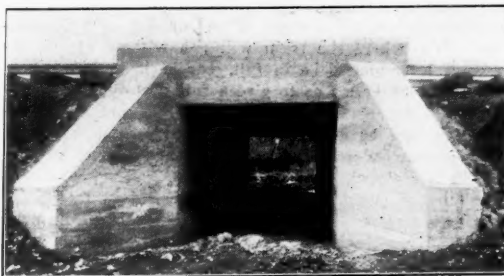
The terminal arrangement at Fifty-second avenue to connect with the Metropolitan road was described in our issue of July 25, page 585, in connection with a description of the project whereby the Metropolitan Company moved bodily the incline structure 1,018 ft. long connecting its elevated tracks with the surface. It is the intention to build stations in all of the towns along the route, the nature and extent of these being a matter that will be settled later.

The main power station is at Batavia, on the Fox River. The building is 202 ft. 4 in. x 160 ft. 6 in., and is built of Illinois buff brick with white stone foundations and trimmings. There are a number of noteworthy features about this station, of which brief mention will be made. The first of these is the coal and ash handling facilities. Outside of the building, parallel to its long dimension, are two coal tracks, under cover, beneath which are the coal bunkers into which coal may be dumped from the cars. Under the bunkers and boiler room is a basement in which are small cars running on track, into which coal from the bunkers may be discharged. Provision is made for elevating these small cars with their loads to a longitudinal track above the boilers from which the coal is dumped into overhead bunkers which feed to the boilers. These same cars may also be loaded with the ashes from the boilers and hoisted to an overhead hopper, which latter discharges into freight cars.

The boiler battery will comprise ten 500 h.p. units, five of which have been installed. They are water-tube boilers having 4,500 sq. ft. of heating surface, and 500 sq. ft. of superheating surface, and were built by the Edge Moor Iron Co., Edge Moor, Del. The front of each boiler is a Kinnear steel rolling door, a novel feature, made necessary by the overhead arrangement of

the third chamber, from which distribution is had to the pumps by means of concrete-lined semi-circular conduits 7 ft. high. Suitable provision is made for closing the gates admitting the water to the chambers, and for cleaning the screens when necessary.

There are six sub-stations, the locations of which may be seen from the map. At the main station the current is stepped up 26,000 volts from which it is conducted to the sub-stations by aluminum cables. The sub-station equipment includes six transformers of the General Electric AB type, which steps down the central station



Cattle Pass—Aurora, Elgin & Chicago.

voltage to 430, from which it is supplied to rotary converters of the General Electric H. C. type running at 1,500 r.p.m., of which there are two in each sub-station. These convert the alternating current of 25 cycles at 430 volts to direct current at 600 volts and feed it directly to the third rails. The sub-stations are built of brick and stone, there being two styles. One of these has a passenger station in conjunction, while the other omits this. There are three of each style, the larger ones being located at Maywood, Warrenville and Lombard.

The cars were built by the Niles Car & Manufacturing Co., Niles, Ohio. They are 47 ft. 3 in. long over all and will seat 56 people. The underframing is formed of 5-in. and 6-in. steel I-beams riveted together with channel plates, and the ends are provided with anti-telescoping plates and are vestibuled. The interior finish is very handsome, the headlining being a blue ornamented with a pattern in silver, while the woodwork is oak rubbed to a dead finish. Above each window sash is a setting of art glass and the ventilating sash are similarly glazed. The cars have cross seats of rattan, furnished by Hale

For connection with the latter wires are brought down from the line at 1,000-ft. intervals. The Carl Electric Co., Akron, Ohio, furnished the bridging telephone system used.

The officers of the company are Mr. L. J. Wolf, President; M. H. Wilson, Vice-President; Harry Greenbaum, Secretary; M. J. Mandelbaum, Treasurer. Mr. Wolf has been prominently identified with several of the important interurban lines in Ohio, and is also President of the Elgin, Aurora & Southern Traction Co. Mr. Mandelbaum has likewise been connected with Ohio electric interurban enterprises.

The operation of the road will be in charge of Mr. Warren Bicknell. Members of his staff will include C. E. Flenner, Auditor; W. W. Crawford, Superintendent of Transportation; Ernest Gozenbach, Electrical Engineer.

A Baltimore & Ohio Railroad Convention.

On Friday and Saturday of last week something like 200 to 250 of the officers of the Baltimore & Ohio Railroad assembled at Deer Park, Maryland, for a little family convention. The company gathered included pretty much everybody from the President down to the technical school boys, who have been at work in the engineering parties during the summer. Practically all of the higher officers were present, as were many undergraduates; and the reader, knowing this and knowing the number assembled, can fill in the outline.

The primary purpose was, we suppose, to bring together the officers of the road in a quite informal way, and to try to cultivate a feeling of respect for the company which they are serving, of interest in it, and of loyalty to it. This seems to be a wise and far-sighted thing to do. Surely, loyalty, zeal, interest in the property, respect and liking for fellow officers—all these go to make up a valuable asset for the company. It is quite likely that no investment which the company could make will yield such large returns as the little time and money invested in an occasional convention of this sort.

Of course, it was necessary to have some excuse for getting this party together, and, in our blessed land, the natural and obvious excuse is to hear someone talk. Therefore, a series of addresses was arranged. On Friday Mr. H. G. Prout, Editor of the *Railroad Gazette*, spoke on the "Relations of the Engineer to the Railroads." On Saturday Mr. Thomas F. Woodlock, Editor of the *Wall Street Journal*, spoke on "Classification of Disbursement

Accounts," and Professor W. F. M. Goss spoke on the "Effect of Modern Tendencies Upon Future Locomotive Design." On this day Dr. Hermann von Schrenk also gave an informal talk of 10 minutes, describing somewhat the most recent work in the matter of seasoning railroad ties.

The Proper Handling of Compound Locomotives.*

I do not deem it necessary to go back to the original design of compound locomotives and carry along the history and developments up to the present time, but will deal with what we have to contend with to-day, as these are the classes of compound locomotives that require our present attention and supervision. In the past 12 years there have been a great number of patents taken out on compound locomotive cylinders. A number of these have been applied to engines and put into service only to be removed again for want of real merit. There have only been two styles of compound cylinders that have weathered the storms of active service, namely, the two-cylinder, or cross compound type, built by the American Locomotive Company at their various works, and the Vauchain four-cylinder type, built by the Baldwin Locomotive Works, and extensively used. To judge by the merits and popularity of these two designs, and from the number of each style that have been built, the Vauchain four-cylinder type would be voted the more desirable and serviceable engine.

The question as to the real merit of efficiency and economy of fuel with the modern compound locomotive, has been so universally acknowledged that no further attention need be given this question. Before proceeding further it might be well to make a starting point, by asking and answering a few questions. First, what was the object of designing a compound locomotive? The answer to this can only be, to economize the expense of fuel. How is this economy obtained? The economy in fuel is the result of passing the steam through two or more cylinders, with the object of obtaining, by a succession of expansions, more work from a given quantity of steam than can be obtained from the use of steam through one cylinder, and by reducing condensation in the cylinder.

In compound locomotives there is an obstacle to be overcome with which the designers of stationary engines do not have to contend. In locomotives the exhaust pressure must be depended upon to create a draught for the fire. Therefore it is impossible to expand the steam down to such a low pressure as is practical in marine or stationary engines, which ordinarily use condensers. In order to obtain a maximum expansion of the steam through two cylinders of a compound, and still have sufficient exhaust pressure left to produce a draught it is necessary to carry a higher steam pressure than in a single-expansion locomotive.

The starting valve, which is the valve used to allow live steam to pass from the high-pressure steam port to the low-pressure cylinder when starting, should be used judiciously. This valve is only intended for admitting live steam into the low-pressure cylinder when starting a train, or in a case of emergency, when about to stall with a train on a grade. Live steam should not be used in the low-pressure cylinder, after the speed of 4 miles an hour is attained. The neglect to close this valve, after the train has been started, or continuously operating the engine with live steam, will soon result in excessive repairs and will be direct evidence of carelessness on the part of the engineer. There will also be a loss of fuel, and the locomotive will be logy. This valve should be closed, and the engine working compound before the reverse lever is hooked back.

Exhaust nozzles, you will find, are very sensitive points on compound locomotives, indeed, a great deal more so than any one would suppose. The size of the exhaust nozzle is very often lost sight of by many men when regulating the engine to steam. I have frequently noticed, when an engine is reported as not steaming, the first thing done to remedy this fault is to reduce the size of the exhaust nozzle regardless of any other fault, or without even trying to locate the direct source of the trouble. This is poor practice on any class of locomotives and should be the last remedy. First examine, and be sure all other parts having an influence on steaming are properly arranged. In all cases avoid reducing the nozzle and aim rather to increase the size; then the working of the engine will be much smoother. A restricted exhaust nozzle invariably results in increasing the back pressure in the cylinders. This condition is objectionable, as it is a retarding force and must be overcome by the live steam pressure.

It has been thoroughly demonstrated that compound locomotives make steam freely with the low-pressure exhaust, and, therefore, it is not necessary to have a sharp sounding exhaust, as on a single-expansion engine. On all styles of compound locomotives the exhaust is much milder than on single-expansion engines. This is due to the fact that the exhaust pressure is much less, and on this account much better results can be obtained by maintaining a light fire. With a deep, heavy fire the mild exhaust does not create sufficient draft to work the fire.

The firemen need not feel alarmed at any amount of abuse or carelessness on the part of the engineer, by using the reverse lever in full stroke, or in slipping the drivers, because he cannot tear the fire to pieces, as on a single expansion locomotive. It is also noticeable that when

a compound locomotive is properly adjusted and fired, the great annoyance of cinders, black smoke, sparks, etc., is overcome to a very great extent. In drifting down grades the ash-pan dampers should be kept closed.

From the experience an engineer has in handling a single-expansion engine, he should not require any further introduction to the reverse lever, but he should use it for what it is intended. The reverse quadrant on all compound locomotives should be so arranged that it cuts off steam in the high-pressure cylinder at about one-half stroke; shorter cut-off will result in excessive compression in the high-pressure cylinder.

We will now assume that the engine is coupled to a train ready to start; the reverse lever at this stage should be in full gear. If the train is heavy and at a difficult starting point, place the starting valve lever in position to allow live steam to enter the low-pressure cylinder. On engines where the starting valve is connected to the cylinder cock lever, the lever has three positions: the normal position is central, when cylinder cocks and starting valve are closed; in the forward position the cylinder cocks are open; rear position starting valves are open, live steam entering low-pressure cylinder. When the train has been started, and a speed of 4 or 5 miles an hour is attained, shut the starting valve, and, as the speed increases, keep hooking the reverse lever back. After the reverse lever has been hooked up to the last notch on the quadrant, or cutting off steam at about one-half stroke in the high-pressure cylinder, and more power is being developed than is required, partly close the throttle, so as to regulate the speed. When ascending a grade, and the speed is being reduced or more power is required, drop the reverse lever a notch and keep dropping it from time to time, to retain the speed of the train, as it is much more economical to retain the speed than to loose it and pick it up again.

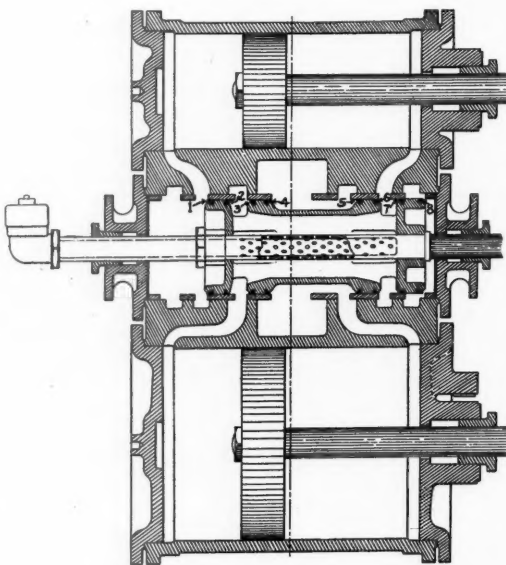


Fig. 1.—The Proper Handling of Compound Locomotives —Testing the Valve of a Vauchain Compound.

When the reverse lever has been let down to full stroke, and the speed reduced to 4 or 5 miles an hour, move the starting valve lever and allow live steam to go to the low-pressure cylinder, thereby increasing the power and keeping the train moving. When running on a descending grade, where the train will run without steam, the reverse lever should be in full gear back or forward, as the case may be, so as to give a full port-opening to the valve. Then open the starting valve, so that a free circulation can be obtained. On long descending grades, it is recommended to use just sufficient steam to keep relief valves closed, thus giving a freer and smoother motion to the engine, besides, this will aid in lubricating the cylinders, and is considered the best method to follow on large single-expansion engines.

A point of importance might here be mentioned in regard to handling high-speed trains. It is a well-known fact that compression and back pressure increases as the speed increases; it also increases as the reverse lever is hooked back and point of cut-off is shortened. Compound locomotives have more power at high speed when run with the throttle partly closed and as long a cut-off as possible. Long cut-off gives a larger port-opening and a later exhaust opening. By partly closing the throttle the steam is wire-drawn and reduces the compression. If compound locomotives could be run by the reverse lever, it would be preferable to do so, but, with a short cut-off, the compression increases at high speed. There is but one way to get the required cylinder power, and that is to use a longer cut-off and wire-draw the steam through the throttle to a point where the boiler can keep up the supply of steam.

Care should be taken never to reverse a compound or single-expansion locomotive equipped with piston valves, except when moving slowly, as it is destructive to packing rings and piston rod packing. With piston valves there is no release for the pressure, as the piston valves cannot raise and allow pressure to escape as with a plain (D) valve.

Cylinders of compound locomotives should not require any more lubrication than a single expansion locomotive,

This is due to the fact that sufficient particles of oil remain suspended in the steam after passing through the high-pressure cylinder, which will properly lubricate the low-pressure cylinder.

When switching, it is advisable to use all styles of compound engines with the starting valve open, or as a single-expansion engine.

On the Vauchain four-cylinder engine, when it is observed that the engine is going lame or exhausts unequally, about the first inspection necessary would be to examine the starting valves and connecting levers. Place the starting valve handle in the cab in central position, then get down and observe the position of the lever on the starting valve. If this is central, that proves these valves to be exactly right. If one side is central and the other side is front or back of central position, the connecting lever rod should be lengthened or shortened, as the case may be. Should the lameness still continue, a rigid inspection of the motion-work for defects, such as bent eccentric rods, loose eccentric rods, bent transmission rod, loose rocker boxes, etc., should be looked for.

With this make of engine there need be no alarm about eccentrics slipping, as they are all securely keyed to the axle, and this key cannot possibly get out of position without seriously deranging the motion. If the motion work is in no way deranged, and the lameness continues, it is then necessary to test the valve packing rings and cylinder packing rings.

Figure 1 (a sectional cut of cylinders and valves), shows the valve packing rings, which are numbered and referred to in the following manner: The rings governing admission and release of steam to high-pressure cylinder are 1, 2, 7 and 8, and those to low-pressure cylinder are 3, 4, 5 and 6. Rings 1, 2, 7 and 8 can be tested as follows: Place the reverse lever in central position, thereby covering all the ports, then open the throttle and admit steam to the ends of the valves. If rings 1 and 8 leak, the steam will blow through, filling both ends of the high-pressure cylinder and central cavity of the valve. The leak can be noticed by steam escaping in a steady blow at high-pressure cylinder cocks, or by removing indicator plugs (if cylinders are so arranged), or on engines having relief valves on the end of extended valve stems, by steam blowing through this valve. If these rings do not leak, no steam should escape from these points.

If rings 5 and 6 to low-pressure cylinder leak, it can be noticed by a steady blow through the exhaust at the same test made for rings 1 and 8. If there should be a small leak through rings 1 and 8, the steam will not be entirely lost, as it goes to do useful work in the low-pressure cylinder.

To test rings 3, 4, 5 and 6, governing the admission and release to low-pressure cylinders, place reverse lever in full gear, with starting valve open and driving brakes on. Open throttle, and if these rings leak it will be indicated by a steady blow through the exhaust nozzle.

To test high-pressure cylinder packing rings, place engine at about quarter stroke, so that valve is open and steam enters high-pressure cylinder at front end. Keep starting valve closed and driving brakes on. Open throttle and admit steam. If the packing rings leak, the steam will pass the ring and down through the center of the valve to the forward end of the low-pressure cylinder, and can be detected by a steady escape of steam at front cylinder cock.

To test low-pressure cylinder rings, keep engine and valve in same position as testing the high-pressure cylinder packing rings, but open starting valve, which gives an increased pressure in low-pressure cylinder. If the packing rings leak, it will be detected by a steady escape of steam at the back cylinder cock.

The testing of valves and pistons for leaks and blows should always be done when cylinders are hot and well lubricated.

Should the high-pressure cylinder packing leak, it would increase the pressure in the low-pressure cylinder, consequently the exhaust would be heavier on this side and sound as if the valves were out. A leak through the low-pressure cylinder packing will decrease the exhaust pressure and cause the engine to have two light exhausts on this side.

In case it is necessary to disconnect the Vauchain engine, on account of a break-down, proceed exactly as you would with a single-expansion engine. The valve, when placed in central position, will cover all ports the same as done by the plain (D) valve.

To locate blows or leaks through the valves or cylinder packing on the two-cylinder type of compound locomotives, precisely the same manner of procedure is followed as on a single-expansion engine. These tests should be made when the cylinders are warm, well lubricated, running slowly, and engine working single-expansion.

In case of break-down, and it is necessary to run in on one side, the engine can be disconnected as readily as a single-expansion engine and in exactly the same manner; the main rod should be taken down, cross-head blocked and valve placed in central position to cover all ports. In all cases, regardless of which side is disabled, the intercepting valve must be in the position to allow the engine to work as a single-expansion engine.

All the different makes of compound locomotives are so arranged that live steam can be admitted to the low-pressure cylinder, so that the power may be increased for starting trains, and to keep them moving on grades, where a single-expansion engine would stall. This feature on the Vauchain compound is governed by the starting valve and has been previously referred to. On the two-cylinder type of compounds, this feature is controlled

*An abstract of a paper by W. J. McCarroll read before the Traveling Engineers' Association, September, 1902.

by the movement of the intercepting valve. One position of this valve allows the live steam to enter the low-pressure cylinder and the engine to work as a single-expansion engine. If the position of the valve is reversed it closes the opening for live steam to the low-pressure cylinder, and opens a passage that allows the exhaust steam from the high-pressure cylinder to enter the receiver and the low-pressure cylinder. The movement of this intercepting valve is at all times under the control of the engineer by a small lever in the cab, and by the movement of this lever the engine can be made to work single expansion or compound at any portion of the stroke.

From the fact that this method of using live steam in the low-pressure cylinders is to be found on all makes of compound locomotives, the engineer has therefore the same duties to perform when operating any class or make of these locomotives; he should be careful not to abuse the engine by carelessness in handling the starting valve, or the intercepting valve, as the economy of fuel and maintenance depends in a large measure on the proper use of these valves.

The Trethewey Automatic Train-Pipes Coupling.

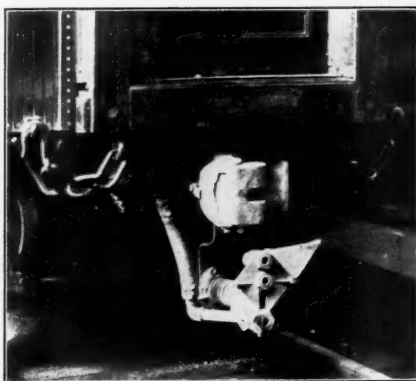
An automatic coupling for the steam and air lines on trains should be flexible, should maintain tight joints and always be positive in action. The variety of conditions met with in the service to which such a device must be subjected presents numerous obstacles to be overcome in order that the system be successful. An interesting example of one of the most recent of these devices which may be said to be successful is shown in the accompanying engravings. It is the Trethewey coupling, designed by Mr. W. G. Trethewey, of Montreal, Canada, and is now in service on trains on several roads.

The device consists of two castings, a hanger and the necessary pipes for connection to the train pipes. The head is a malleable iron casting having two diagonal guide horns, with a flattened shank at the rear. These heads are cast from one pattern and are, therefore, interchangeable. The flat sides of the shank are placed vertically. The shank projects back through a slot in the hanger and has rigidly attached at the rear end the second casting above referred to, which is a supporting bracket, the form of which may be seen plainly in the engraving. The hanger for supporting the coupling is made of a piece of flat steel $\frac{1}{2} \times 4\frac{1}{2}$ in. It runs along under the stem of the coupler, from which it is supported by two U-bolts passing around the stem, each carrying on the lower ends a slotted yoke, through which the hanger passes. At its forward end the hanger is semi-circularly curved and from the lower side of this curve it drops vertically, the slot through which the flattened shank of the coup-

nections to the pipes at the lower ends being near the point around which the head moves, the hose is not disturbed by the motions of the latter.

Referring to the engraving of the end view of the car, the lower opening in the coupler head is the steam duct. This is placed a sufficient distance below the air and signal ducts so that the soft rubber gaskets used in the latter will not suffer impairment from the heat. Provision is made for the introduction of steam pressure back of the steam-joint gaskets to insure their being held tightly together in service, preventing leakage. The steam duct is also provided with an automatic drip valve to carry off condensation and prevent freezing. Arranged in the signal and steam connections are valves which are reciprocally opened by the coming together of the cars so that in switching and making up trains these parts require no attention.

For coupling with cars not equipped with this device a detachable hood is provided having ducts to register with the air and steam ports on the coupling head. At the back of the hood, nipples screwed into the ducts have hand couplings attached, to which latter the usual air and steam couplings may be connected. The device is easily and quickly attached to a car, no changing of



End View, Trethewey Steam and Air Coupling.

parts being necessary, and it is claimed that an entire train can be fitted up in half a day's time.

All of the preliminary trials for testing and improving the device were made on the Canadian Pacific, and that road is so well satisfied with their experience with the device that they have decided to adopt it at once on 100 cars. The Imperial Transcontinental Limited trains of the Canadian Pacific are fitted with these couplings, and we understand that the Delaware & Hudson has three trains so equipped and the Intercolonial of Canada has ordered equipments for 10 cars.

The Trethewey Automatic Steam and Air Coupling Co., Limited, Montreal, Canada, Mr. T. A. Trenholme, President, has been formed to place this device on the market.

Train Accidents in the United States in August.¹

unf, 2nd, 3 a.m., Illinois Central, Magnolia, Miss., a freight train was derailed at a misplaced switch and the engine and 13 cars fell down a bank. One brakeman was killed and two other trainmen were injured. It is said that the switch was undoubtedly maliciously misplaced.

bc, 3rd, New York, Ontario & Western, Hortons, N. Y., butting collision of milk trains, wrecking both engines and five milk cars. The engineer and fireman of the southbound train and the fireman and one brakeman of the northbound were killed. The southbound train had run a mile beyond a siding where it should have waited, according to a special order, for the northbound.

*xc, 3rd, 8 p.m., Atchison, Topeka & Santa Fe, Los Angeles, Cal., a passenger train ran over a misplaced switch and collided with some cars of oil, wrecking the engines of both trains, one passenger car and four freight cars. The fuel tank of one of the locomotives exploded and burning oil was scattered in every direction. An oil refinery was set afire and with most of the wreck of the two trains, was completely destroyed. One fireman was killed and two passengers and three trainmen were injured.

eq, 3rd, Ann Arbor, Cadillac, Mich., an excursion train of 11 cars was derailed and many cars were badly damaged. Eleven passengers were injured. It is believed that the derailment was due to the breaking of the flange of a wheel of the baggage car.

*unx, 3rd, Central of New Jersey, Bayonne, N. J., a train of empty passenger cars, drawn by an engine running backward, was derailed and the first three cars were badly damaged. The fireman was injured. The wrecked cars took fire, but the city firemen soon extinguished the flames.

unx, 5th, Norfolk & Western, Peebles, Ohio, a freight train was derailed, making a bad wreck. One trainman was killed and four were injured, one of them fatally.

bc, 6th, Chicago, Milwaukee & St. Paul, Rhodes, Iowa,

¹Accidents in which injuries are few or slight and the money loss is apparently small, will as a rule be omitted from this list. The tabular record of totals is no longer kept, as a more complete report of the total number of accidents is published by the Interstate Commerce Commission. The classification of the accidents is indicated by the use of the following

ABBREVIATIONS.

- rc Rear collisions.
- bc Butting collisions.
- xc Miscellaneous collisions.
- dr Derailments; defect of roadway.
- eq Derailments; defect of equipment.
- dn Derailments; negligence in operating.
- unf Derailments; unforeseen obstruction.
- unx Derailments; unexplained.
- o Miscellaneous accidents.

An asterisk at the beginning of a paragraph indicates a wreck wholly or partly destroyed by fire; a dagger indicates an accident causing the death of one or more passengers.

butting collision between a work train and an eastbound freight train, both running at good speed. Both engines and many cars were wrecked, the cars of the work train being piled up on top of one another. Both engineers and nine laborers were killed and 30 other employees were injured. The collision was due to a misunderstanding between two work-train conductors concerning flagging.

bc, 7th, 3 a.m., Central of Georgia, Millen, Ga., butting collision between freight train No. 39 westbound, and freight train No. 42 eastbound, wrecking several cars. Two trainmen were injured.

unx, 7th, Chicago Great Western, Orville, Iowa, freight train No. 60 was derailed while running at good speed and five cars were derailed. A tramp was killed.

unx, 9th, Missouri Pacific, Sedalia, Mo., a freight train was derailed, and one employee was killed and one passenger and four employees were injured. The track had recently been changed from narrow to standard gage.

unx, 9th, Chicago Great Western, Elizabeth, Ill., passenger train No. 9 was derailed and two cars were derailed. One passenger and one trainman were injured.

unx, 9th, 1 a.m., Gulf, Colorado & Santa Fe, McGregor, Texas, a freight train was derailed and the engine and 18 cars were wrecked. A brakeman was killed.

bc, 10th, Southern Railway, Danville, Va., butting collision between a northbound passenger train and a southbound freight, wrecking both engines and several cars. Two tramps were killed and five trainmen were injured.

unf, 10th, Delaware, Lackawanna & Western, Morristown, N. J., a locomotive was derailed at a washout and overturned. One brakeman was killed and two other trainmen were injured.

bc, 11th, Norfolk & Western, Genoa, W. Va., butting collision of freight trains, making a bad wreck. One employee was killed and four were injured, two of them fatally.

bc, 11th, Louisville & Nashville, Franklin, Tenn., butting collision between a freight train and a work train, wrecking both engines. A section foreman on the work train was killed.

*xc, 11th, 1 a.m., Pennsylvania road, Harrisburg, Pa., a passenger train collided with a freight, wrecking several cars. Seven freight cars were destroyed by fire.

eq, 11th, Pennsylvania Lines, Warsaw, Ind., a westbound freight train was derailed by a broken axle, wrecking 25 cars. A part of the wreck fell on the adjoining main track, and it was run into by an eastbound passenger train. The engine and two cars of the passenger train were badly damaged. One fireman was injured.

unf, 11th, New York Central & Hudson River, Pawling, N. Y., a passenger train was derailed at a washout and three cars were overturned. Nine passengers were injured.

dn, 12th, 4 a.m., Central of New Jersey, Elizabethport, N. J., a northbound freight train ran into an open draw at the crossing of the Elizabeth River, and the engine and eight cars fell to the stream below. The fireman and one brakeman were killed and the engineer was injured. The engine was completely submerged. One of the wrecked cars contained dynamite.

xc, 15th, Illinois Central, Bridge Junction, Ill., collision between passenger train No. 3 and freight train No. 53, badly damaging the engine of the passenger train and several cars of the freight. The passenger engineer was injured.

xc, 16th, Southern Pacific, Wadsworth, Nev., a passenger train ran over a misplaced switch and into a switching engine standing on a side track. The passenger engineer was fatally injured.

dn, 16th, Cincinnati, Richmond & Muncie, Druley, Ind., a passenger train was derailed and the engine was badly damaged. The engineer jumped off and was killed, and one passenger and two trainmen were injured. It is said that the train was running too fast on a poor track.

rc, 17th, Chicago & North Western, Humbolt, Iowa, a freight train was run into at the rear by a following freight, and the caboose was wrecked. The conductor jumped off and was killed, and six drivers and one trainman were injured.

rc, 17th, Chicago & North Western, Dakota City, Iowa, rear collision of freight trains; one trainman killed.

xc, 17th, Hammond, Ind., an excursion train of the Chicago, Indianapolis & Louisville ran into a freight of the Erie Road, damaging the locomotive, baggage car and caboose. A man in the caboose of the freight train was killed and another was fatally injured.

o, 17th, Chesapeake & Ohio, Covington, Va., the locomotive of a freight train was wrecked by the explosion of its boiler, and the engineer, fireman and one brakeman were injured.

xc, 18th, Chicago, Burlington & Quincy, Holdrege, Neb., collision between an empty engine and a freight train, wrecking both engines. One engineer was killed and two other trainmen were injured.

xc, 18th, Bluffton, Ohio, a freight train of the Northern Ohio ran into a passenger train of the Lake Erie & Western at the crossing of the two lines, and the passenger engine and several freight cars were badly damaged. Three trainmen and one passenger were injured.

unf, 18th, 4 a.m., Chicago, Rock Island & Pacific, Letts, Iowa, an eastbound passenger train was derailed at a washout and five cars fell down a bank, lodging in 5 ft. of water. The passengers and trainmen all escaped with slight injuries.

unx, 18th, 4 a.m., Cleveland, Cincinnati, Chicago & St. Louis, Rising, Ill., passenger train No. 4 was derailed at a washout, and the engineer and fireman were injured.

*xc, 19th, 9 p.m., Belmar, N. J., a Central of New Jersey train of empty passenger cars collided with a passenger train of the Pennsylvania Railroad, wrecking three passenger cars. Two passengers were killed.

unf, 19th, Chicago, Burlington & Quincy, Fenton, Ill., the locomotive of a freight train was derailed, presumably by the softening of the roadbed by rain, and the engine was overturned. The fireman was killed and two other trainmen were injured.

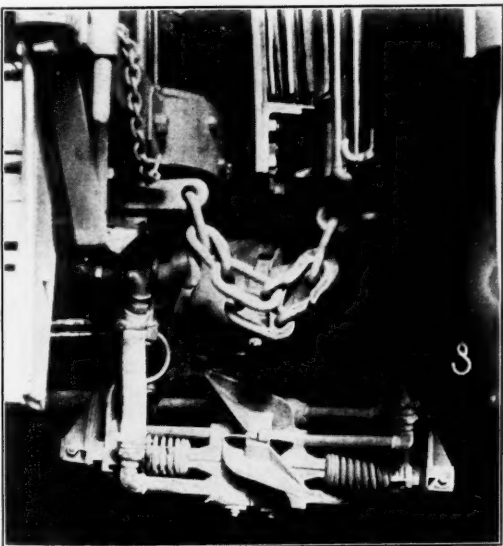
19th, 1 a.m., Wisconsin Central, Fremont, Wis., a passenger train was derailed and all of the cars were badly damaged. Four passengers were injured.

bc, 20th, Buffalo, Rochester & Pittsburgh, Warsaw, N. Y., butting collision of freight trains, one of which was drawn by two engines, making a bad wreck. Three trainmen were injured, one of them fatally.

xc, 20th, 9 p.m., New York Central & Hudson River, Hoffman's, N. Y., an eastbound freight train broke in two, and the rear portion afterwards ran into the forward one, wrecking several cars. Four workmen, riding in a car in the middle of the train, were killed, and a fifth was injured.

unx, 20th, 1 a.m., Southern Railway, Danville, Va., northbound passenger train No. 38 was derailed at a switch, and the engine of the train and several freight cars standing on a side track, were badly damaged. Two trespassers were injured.

bc, 22nd, Southern Railway, Gurley's, Ala., butting



Side View, Trethewey Steam and Air Coupling.

ling passes being at the lower end of the vertical part. The forward part of this hanger may be seen in the illustrations. Between the hanger and the head is a helical spring which is under compression when the train is coupled up.

The arrangement and application of the device having been explained, the reason for its flexibility in service will be readily understood. Each coupler is supported at but one point—the slot in the hanger. When uncoupled, the shank and head are maintained in horizontal alignment by the supporting bracket on the rear end of the shank, the face of which is held against the hanger by the helical spring. As will be seen from the engraving, when the train is coupled the brackets are forced away from the hangers by the compression of the springs, permitting the heads to move freely in any direction about the points of support.

The arrangement of pipes and hose connections is apparent from the illustrations. Short lengths of pipe are screwed into the heads, extending back to points vertically below the car pipes, or approximately so, and these points are at each side of, and close to the point where the shank passes through the hanger. This arrangement permits the use of short lengths of hose; and the con-

collision of freight trains, wrecking both engines and several cars. One fireman was killed and two other trainmen were injured.

ic, 22nd, 9 p.m., Baltimore & Ohio, Claysville, Pa., butting collision of freight trains in a tunnel, wrecking both engines and several cars. One fireman was killed and four trainmen were injured, one of them fatally.

22nd, Kansas City Southern, Myrtis, La., a passenger train was derailed and the engine and five cars were ditched. A number of passengers and trainmen were injured.

unf, 22nd, Southern Pacific, Lasca, Texas, a passenger train was derailed by a washout, and the engine and first two cars were ditched. The engine and first two cars were ditched. The engine and first two cars were ditched.

*rc, 23rd, 1 a.m., New York Central & Hudson River, Hoffman's, N. Y., a train of empty passenger cars was run into at the rear by a following freight train, wrecking several cars. The wreckage was somewhat damaged by a fire, which started immediately after the collision.

rc, 28th, Lake Shore & Michigan Southern, Toledo, Ohio, eastbound mail train No. 32 ran into the rear of a preceding train of freight cars, which was being pushed by a switching engine, running tender first, damaging both engines.

unf, 28th, 6 a.m., Vicksburg, Shreveport & Pacific, Jackson, Miss., a westbound passenger train was derailed by a tree, which had fallen across the track. The fireman was killed and the engine and first two cars were ditched.

28th, Chicago & Eastern Illinois, Cayuga, Ind., a passenger train ran over a misplaced switch and into a freight train standing on a side track, wrecking the engine, baggage car and three freight cars. The engine and first two cars were ditched.

dn, 28th, New York, New Haven & Hartford, Saybrook, Conn., an eastbound freight train was derailed at the derailing switch approaching the drawbridge over Connecticut River, the bridge being open, and the engine and 11 cars were ditched. A brakeman was injured.

rc, 29th, 5 a.m., Southern Railway, Lenoir, Tenn., pas-

and the engine and one passenger car were wrecked. The wreck took fire and one car was destroyed.

unf, 30th, Chicago, St. Paul, Minneapolis & Omaha, Fairchild, Wis., a passenger train running at low speed was derailed at a washout and the engine was overturned. The engine and first two cars were ditched and two mail clerks were injured.

rc, 31st, 1 a.m., Baltimore & Ohio, Sand Patch, Pa., a passenger train ran into the rear of a preceding freight in a tunnel, and the engine and several cars were damaged. Four trainmen and six passengers were injured.

*rc, 31st, Chicago & North Western, Stanwood, Iowa, a fast stock train ran into the rear of a preceding stock train, wrecking the engine, caboose and several cars. The wreck took fire, but the fire was extinguished by the town firemen. One drover was killed and two were injured.

New Wabash Station at Danville, Ill.

The Wabash has just completed an attractive passenger station at Danville, Ill., an engraving from a photograph of which is shown. The building is 123 ft. long by 26 ft. wide with an ell 41 ft. by 26 ft., and is two stories high, with a basement for the heating plant.

The foundation is Williamsport sandstone laid upon a footing course of 12-in. Portland concrete. The cut stone base extends up to the bottoms of the windows, from which level the walls are gray pressed brick with Williamsport sandstone trimmings. The roof covering is blue Bangor slate.

The main building is occupied by the general waiting room, baggage room and ticket office. The general waiting room, which is 87½ ft. long, has the walls finished in plaster, above a dado of Tennessee marble, the dados of the vestibules being also of the same material. The floors of the vestibules and waiting rooms are laid with Marble-tic tiling, and the overhead finish of the main waiting room, which extends into the roof, is in the natural wood, the roof trusses being of timber and the under part of the roof being ceiled.

The first floor of the ell has private waiting rooms for men and women, and the lavatories. Midway of the length of the building at the front is an octagonal tower, the lower floor of which is the ticket office and the second floor is the telegraph office. This floor connects with the second floor of the ell by a bridge 5 ft. 6 in. wide across the passageway between the two parts of the main waiting room. The three large windows in this room, at the rear end of the building in the photograph, are of art glass, box pattern work. All other windows and doors have plate glass.

The baggage room, 31 ft. 7 in. long by 22 ft. 9 in. wide, has its floor 6 in. lower than the general waiting room. The building is heated by steam. It is piped for gas and wired for electric light, the light fixtures being of the combination variety. The platforms and walks are made of granitoid.

T. C. Link, St. Louis, was the architect for the station; we are indebted to Mr. W. S. Newhall, Chief Engineer, for data.

Railway Transportation Association.

A meeting of the Railway Transportation Association was held at the Hotel Iroquois, Buffalo, N. Y., Friday, Sept. 19, representatives of between 40 and 50 roads being present. In opening the meeting the President called at-



New Passenger Station of the Wabash Railroad at Danville, Ill.

An employee riding in one of the passenger cars was killed.

xc, 23rd, Pennsylvania Road, Cochran, Pa., a northbound passenger train ran into a southbound freight, which was waiting on the main track, and both engines, two passenger cars and four freight cars were damaged. Three passengers and two trainmen were injured.

o, 23rd, Chicago & Alton, Mexico, Mo., the locomotive of a freight train was wrecked by the explosion of its boiler; a brakeman was killed and three other trainmen were injured.

xc, 24th, 3 a.m., Southern Railway, Georgetown, Ind., an eastbound freight train collided with some freight cars which had broken away from the rear of a preceding freight, and two engines and 14 freight cars were wrecked. The collision occurred on a trestle bridge 30 ft. high, and most of the wreck fell to the ravine below. Three trainmen were killed and two injured.

dn, 24th, 1 a.m., Chicago & North Western, Marshalltown, Iowa, passenger train No. 6 was derailed at the derailing switch approaching the crossing of the Iowa Central, and the engine was ditched.

24th, Lehigh Valley, Ensenore, N. Y., a passenger train was derailed and the first two cars were overturned and fell into Owasco Lake. Four passengers were injured.

rc, 25th, Northern Pacific, Minneapolis, Minn., a freight train ran into the rear of a preceding freight, damaging the engine and several cars. The fireman jumped off and was killed.

bc, 25th, 4 a.m., Illinois Central, Mounds, Ill., butting collision between passenger train No. 4 and a freight train, damaging both engines and several cars. Three baggage cars were overturned. Two trainmen were injured.

dn, 25th, 8 p.m., Northern Pacific, Tacoma, Wash., a freight train was derailed at a stub switch, while running at high speed, having become uncontrollable on a descending grade. The engine and some cars on a side track were damaged. The engine and first two cars were ditched.

unf, 25th, 3 a.m., Southern Railway, Harbins, S. C., passenger train No. 35 was derailed at a misplaced switch, and the engine and first four cars were overturned. Four mail clerks were injured and a number of passengers slightly hurt. It is said that the switch had been maliciously misplaced.

unx, 25th, Columbia, Newberry & Laurens, Sligh's, S. C., a freight train was derailed and the engine and several cars were ditched. The fireman was killed and the engine and one brakeman were injured.

unx, 25th, 11 p.m., Southern Railway, Busey, Ky., a freight train was derailed and several cars were wrecked. A brakeman was killed.

bc, 26th, 11 p.m., Delaware, Lackawanna & Western, Buffalo, N. Y., butting collision between a westbound switching engine and an eastbound passenger train, badly damaging both engines. One engine was jumped off and was injured. The empty engine, being in back motion, and deserted, ran back after the collision about 10 miles, to Lancaster.

unx, 26th, Philadelphia & Reading, Coatesville, Pa., an inspection locomotive was derailed and fell against the side of a rock cut. The general superintendent, the superintendent of the division, the engine and the fireman were injured.

unx, 26th, Holston Valley Road, Bristol, Tenn., the rear car of a passenger train was derailed and overturned and one passenger was injured.

unx, 27th, St. Louis, Iron Mountain & Southern, Illinois, Ind. T., a work train was derailed and several cars of rails were overturned. One employee was crushed to death beneath the rails, and five were injured.

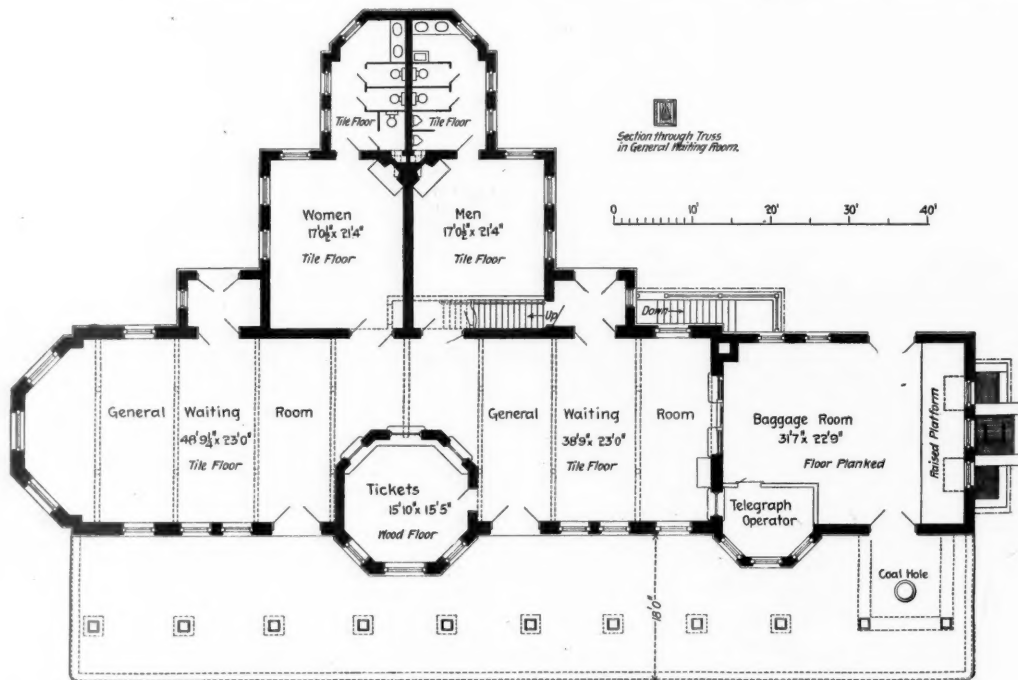
27th, New York, New Haven & Hartford, Westfield, Mass., a passenger train was derailed, and the engine and baggage car fell down a bank. The engine and the fireman were injured, the latter fatally.

senger train No. 35 ran into the rear of a preceding freight, wrecking the caboose and two freight cars. Four trainmen were injured, one of them fatally.

xc, 29th, New York, New Haven & Hartford, Newton Upper Falls, Mass., a passenger train ran over a misplaced switch and collided with a coal car standing on a side track. The engine and coal car were overturned in the ditch. A man on the coal car was killed and the fireman was injured.

eq, 29th, Chicago, Burlington & Quincy, Kemper, Ill., a freight train was derailed by the breaking of the flange of a wheel, and 12 cars were wrecked. Most of the wreck fell through a bridge. A man riding on one of the cars was injured.

*fo, 30th, Chicago & North Western, Meriden, Minn., the cars of passenger train No. 7, running about 35 miles an hour, were lifted from the track by a tornado, and thrown down a bank. The wreck took fire from the oil lamps in one of the cars. Two passengers were killed and 18 injured, three of them fatally.



The Wabash Station at Danville.

unx, 30th, Pittsburgh, Cincinnati, Chicago & St. Louis, Logansport, Ind., a switching engine was derailed at a street crossing. An injured employee, being carried on the front end of the engine, together with another employee, taking care of him, were thrown off and killed.

dr, 30th, Delaware, Lackawanna & Western, Norwich, N. Y., a freight train was derailed at a defective switch and the engine and first two cars were ditched.

*rc, 30th, Pennsylvania Road, Lenola, N. J., a train of empty passenger cars ran into the rear of a preceding passenger train which had been unexpectedly stopped,

tention to the fact that this was a deferred meeting replacing the summer meeting which was usually held in July, having been postponed in view of the fact that per diem rules were inaugurated the first of July. It was the belief of those interested that a conference devoted largely to this subject at a time when representatives could draw upon their experience of two or more months' operation under the rules would be beneficial to all concerned.

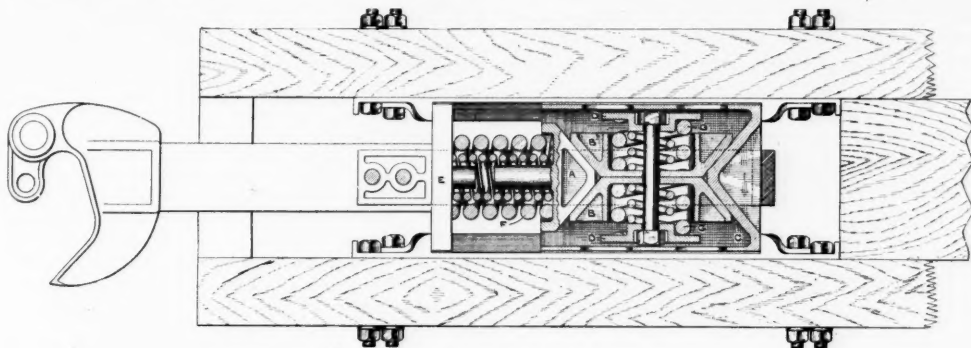
The first committee report of importance was that on the subject of Transfer of Freight. This committee through replies received in general correspondence, with the roads interested, is led to believe that no change in the method of settling for transfer of freight is advisable at the present time, especially in view of the fact that per diem rules in operation for the past two months or more appear to act as an incentive to handle freight in through cars, thereby reducing the transfer.

The subject of per diem occupied almost the entire day, the remarks thereon partaking largely in the nature of an "experience meeting." It would appear from these remarks that there is as yet a considerable lack of uniformity in the interpretation of the rules. These facts are illustrated by statements as to the practice with regard to settlement with non-per diem roads, a number of representatives stating that all settlements were made "in kind," that is on a per diem basis with per diem roads, and on a mileage basis with non-per diem roads; others stating that so far as railroad cars were concerned they paid per diem on all cars whether owned by per diem roads or non-per diem roads. An extended discussion on the subject "What Constitutes an Embargo," under Rule 15, developed the fact that some roads are endeavoring to regulate traffic by the issuance of embargo notices day by day. This apparently is not in accordance with the purpose of the rules as was evident by the remarks of many of the representatives as to the practice regarding embargos already established under these rules.

The next meeting of the Association will be held in Buffalo in January, 1903. Officers were elected for the ensuing year as follows: President, Thos. O. Cole, Lehigh Valley R. R., South Bethlehem, Pa.; Vice-President, Thos. R. Limer, Hocking Valley Ry., Columbus, Ohio; Secretary and Treasurer, G. P. Conard, 24 Park Place, New York.

The Republic Friction Draft Gear.

In the discussion of the report of the draft gear tests submitted at the M. C. B. convention some of the members urged the necessity for simplification of gears, using the friction principle in order to reduce the expense of application. The accompanying illustration shows one of the most recent designs of friction gear, the designer of which seems to have had the above conditions in mind. As will be seen the device consists of a front friction plate A, against which acts a standard M. C. B. spring; two



Republic Friction Draft Gear.

side friction plates B, which are held together by two helical springs retained in position by a tension bolt and the spring plates D. An incline at the rear end of the housing C corresponds to the friction plate A. The whole is mounted within the coupler yoke and placed in the pocket as in ordinary construction.

The action in service is obvious. In buffing the coupler shank pressing against the front follower plate E compresses the M. C. B. spring to the limit imposed by the dowels. The capacity of this spring is 19,000 lbs. When the dowels come together under pressure the front friction plate is forced between the two side friction plates against the pressure of the two springs, while the side plates are in turn forced against the incline at the rear of the housing. In pulling, the action is, of course, simply reversed, the stress being taken against the front follower plate. The total movement of the drawbar permitted by the device is 3 in., 1½ in. of which is due to the M. C. B. spring.

Economy, durability and efficiency as well as low first cost are claimed for this gear. Its simplicity is apparent. It is handled by the Republic Railway Appliance Co., Chicago and St. Louis, Mo.

Leaky Flues.

Abstracts of the two papers presented at the meeting of the Western Railway Club in Chicago on the 16th inst. are printed in another column. In the discussion of the first of these papers, on "Locomotive and Car Scrap," it was evident that the methods of handling scrap employed by the different roads represented in the discussion were almost as varied as the names of the roads themselves. It was remarked in the discussion that the scrap has got to be handled according to the conditions obtaining in the shop yards and the disposition to be made of it after it is received, which, of course, differ with each road. On some roads the mechanical depart-

ment receives all of the scrap on the system, a part of which must be credited to the maintenance of way department. This involves a careful sorting and weighing. Roads making their own axes must have a different method of handling the scrap from the cars than those who sell such scrap. The saving resulting from a careful handling and sorting of scrap was generally admitted, it being possible to use over again a large percentage of material found in the scrap piles. Naturally the main object to be considered in the handling of scrap is to do so at a minimum of cost so that the arrangement which affords facilities for handling it the least number of times between accumulation and final disposition is the one which every road should endeavor to have.

Extracts from the discussion of the paper on "One Cause of Leaky Flues," by Mr. S. W. Miller are given in the following:

Mr. Miller (P., C. C. & St. L.): I spent a great deal of time getting this information, because I could not find any two opinions alike, and I found that almost everything that I asked for was a matter of opinion. Nobody had any facts, no explanation, no reason why these things were as they stand, and while it looks curious to think that 1/32 of an inch difference in inside and outside diameters of a hole in the sheet should make a serious difference in the behavior of the flues, yet after several months of careful watching of the thing I believe that rounding up those flues has helped us far more than any other thing that I know of. Of course if we could purify the water, we would get at the main trouble, but we cannot get that done; I do not suppose we ever will. I do not think there are enough purifying plants in the United States at the present time to purify the water that we use on our road, and it will be a great many years before we get the plants for that purpose.

Mr. H. T. Bentley (C. & N. W.) sent a letter in which he referred to his experience on two divisions of the road, on one of which there was good water and on the other it was the reverse. He gave it as his opinion that no matter how much care was exercised in putting in flues, if the water is bad they will leak, just the same; and they will not give trouble where the water is good.

Mr. T. A. Lawes (C. & E. I.): We have a large number of leaky flues, especially towards fall, going into the winter; it is worse right after the warm spell. Every year I look out for leaky flues about this time of the year, and after a thorough rolling of these flues and fixing them up, the difficulty has been overcome in a great measure. I think this condition of leaky flues is probably on

caused by the overheating of the flue ends, and if you can keep water in a solid form up against the sheet which would overcome this overheating to some extent, it would then seem reasonable, if you increase the water space and obtain a better circulation, that it would minimize this trouble with the flues. We do not have much trouble in the beginning, but after the engines have gone about 25,000 miles they begin to need more or less attention and gradually get worse.

I also hope to hear about the use of the copper thimbles or ferrules. We were thinking of experimenting on lengthening out the ferrules, just in order to see what would take place. We have tried ferrules of different thicknesses and so far as I am able to say it was shown that the thinner the sheet is, the better the result would be. We have tried flue ends of different thicknesses with very little difference. I do not think the No. 7 ends give better results than the No. 11. We have not arrived at any definite conclusion as to whether the No. 1 steel flue gives any better results than the practical arch. We are now considering trying thimbles on the flues. We are thinking of trying a steel thimble about 1/4 in. thick in order to carry the gases away from the surface of the flues where they are in the flue sheets, with what results I do not know. I think the flue question is a very serious one. We are not the only ones that have trouble, and it is a question whether it overcomes the advantage of that class of engines with the wide fire-box, because it can do so much more work than an engine with insufficient grate surface; but it certainly has produced considerable trouble in the flue question. I would be very much interested in hearing from anybody who has anything to say on this flue question, especially in relation to the width of the fire-box and any advantage gained by extending the brick arch down to the flue sheets to keep them from the air.

Mr. P. H. Peck (C. & W. I.): I have used steel thimbles with western waters; we turned the thimbles up. But they got so hot that they soon got loose and came out.

Mr. Lawes (C. & E. I.): History repeats itself. When I first started railroading we used to have wood-burning engines, and used the cast-iron thimble at the ends of the flues, on account of the flues being covered. The reason given for using cast-iron thimbles instead of wrought-iron, was that if you take a wrought-iron plate, heat it and let it cool several times you will find that it will contract; but the reverse is true in regard to the cast-iron thimbles. A cast-iron thimble necessarily would have to be heavier than a wrought-iron thimble.

Mr. F. D. Fenn (Crane Co.): I see that there is one point that has not been touched upon here to-day that came out very strongly in the Traveling Engineers' Convention with regard to leaky flues. The question came up of drafting the engine by a method of raising and lowering the diaphragm, changing the draft so that it would not make a heavy draft through the fire-box when the door was open, and thereby keeping the flues tight. I have a recollection of an instance where we had an engine with leaky flues on our division that burned her fire very hard at the rear end of the fire-box; we changed the diaphragm so that we made the draft come up farther towards the flues and burn the fuel more evenly over the grate. We found there was a great difference, the flues stopped leaking and we did not have any more trouble with that engine for a considerable time.

Mr. C. F. Lape: I believe that for the reason that the flue sheet in the narrow fire-box is not more than about two-thirds as wide as that in the larger fire-box, it does not have as great expansion and contraction. Another thing that is the cause of leaky flues in my opinion and nowadays more so than it used to be when we had deep fire-boxes and smaller boilers, is the fact that we had short flues; there was seldom a flue that was over 12 ft. long; now we have them as long as 18 or 20 ft.

Another thing is that we are using 1/2, 5/8 and 3/4-in. flue sheets. You can see the amount of flue that is exposed to heat and not protected by the water. My practice in setting flues has been to drill the flue hole just to the outside diameter of the flue, swedge the flue, then take a copper ferrule made of 50-lbs. copper (I never use anything less than that; I have used 30-lb. copper and it was a failure; I have set flues without any copper at all and it was a failure even in good weather). Put the copper ferrule into the sheet flush with the inside sheet, and drive the flue into the flue sheet about 2 1/4 in., turn the flue over, expand it well and roll it. I never allowed any one to use a round mandrel on a flue hole; I think there are more flue holes spoiled by using a round mandrel than there are by using the rollers. Of course you can break a flue bridge by using the rollers.

I had a set of corrugated flues sent me and I put them into an engine that was a poor steamer and I was surprised to see how well the engine steamed with that set of flues and how much longer they lasted than the flues in other engines on the road; and I got to looking the matter up and I believed that I had solved the problem. The corrugated flue was made of No. 13 wire gage, while we were using a No. 9 flue; we got a great deal thinner flue, a great deal stiffer flue, and I am satisfied that there is not the amount of vibration in the corrugated flue from the fact that it was more than half lighter and a great deal stiffer than the big heavy flue.

Mr. F. C. Cleaver: Recently I have been connected with a road, some parts of which had pretty bad water. I recollect that we got ten wide fire-box engines and I

(Continued on page 744.)

It seems reasonable that this flue trouble is largely



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EDITORIAL ANNOUNCEMENTS.

CONTRIBUTIONS—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussion of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

ADVERTISEMENTS—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and these only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.

In the speech of President Roosevelt at Cincinnati the other day he expressed the opinion that it would be better for the States themselves to control the corporations, but he does not see the "slightest prospect of agreement among the States" and, therefore, he recommends a constitutional amendment, while well aware that this process is necessarily slow. Far be it from us to quarrel with his preference for control by the States rather than by the nation; but, if the States cannot agree pretty well as to laws, what chance is there that they will agree as to a constitutional amendment, under which they would surrender forever their powers and their freedom of action? We should say, that the President's proposition for a constitutional amendment is the most harmless one that he could make, for it comes nearest to being impossible.

The compilation of gross and net earnings for July as made by *The Chronicle*, appeared last week. One hundred and three roads are included, with total earnings of almost 103 million dollars, gross. The increase was 5¼ million dollars, as compared with the year before, but the increase in operating expenses was even greater; that is, \$190,000 greater than the increase in gross. Consequently, there was a decrease of close to \$190,000 in the net. This last is something that has not happened for a good while. In percentages, the increase in gross was 5.38 per cent.; the decrease in net a little more than one-half of one per cent.; but the comparison is made with a month in which the increase in gross was 14.28 per cent., and the increase in net 26.17 per cent. In fact, both gross and net have increased in July of every year since 1894. The principal decreases in gross and net are among the anthracite roads, although some of the grain carrying roads show rather important decreases. Much the greatest increase is on the Pennsylvania (entire system). There the gross increased \$1,971,600, and the net increased \$952,900. The Rock Island, the Baltimore & Ohio, the Louisville & Nashville, the Canadian Pacific, the Southern, the Union Pacific, the Norfolk & Western, the Grand Trunk, the Southern Pacific and the Atlantic Coast Line, all made very large increases in gross, running from \$200,000 up almost to a million.

What Is the Future Compound Locomotive?

In a very interesting address the other day, Professor Goss made two or three pretty important points about the future compound locomotive. It seems to us (Professor Goss did not say it) that there is something like a reaction against compound locomotives in this country. Some of the railroads which have used a good many of them are changing to simple engines, because of difficulties that they have experienced. But if Professor Goss had said

that there is such a reaction, he would doubtless have said that it is a question of design, and not of principle.

His first point was that the future compound engine for our service will have four cylinders. The powers that we now require are so great that the dimensions of the low-pressure cylinders are as big as the road clearances will take. But there is a fundamental difficulty with four cylinder compound locomotives as used in this country which will become more and more apparent as the power to be delivered at the rim of the driving wheels increases. All this power must be taken through two crossheads (one each side) and through one axle and two main rods; so we have already got parts that are, to say the least, inconveniently big. We have driving axle journals of 10-in. diameter—quite respectable steamboat shafts—and we have crank pins 8¼ inches in diameter. With the Vaucain compound there is still a further objection in the unequal strains brought on one crosshead; but even with the tandem the power must be sent through one set of crossheads and one axle. This is true also of some other four-cylinder designs.

The De Glehn design, as our readers know, puts two of the cylinders inside the frame and two outside. Two are connected to one axle and two to another, and the driving wheels are coupled by side rods. Thus the stresses in cross heads, guides and main rods, and on crank pins, and in all other parts, are divided. In this way we get lighter parts, we diminish the chance of breakage, we add to the convenience of repairs, for lighter and smaller parts are easier to handle.

Three objections arise immediately. We are told that this arrangement is complicated; the cylinders, valve motions, and other parts, are doubled in number. We are told also that this involves the cranked axle, which has long been a favorite bugbear. Furthermore, the parts inside the frames are comparatively inaccessible.

Professor Goss dwelt upon the idea that what we are really afraid of is not complication, but bad design. A greater number of parts, well designed, will give less trouble than a smaller number badly designed; and, with the diminution of the strains on individual parts, we may reasonably believe that maintenance of well designed machines will cost less than will the simpler mechanism of inferior mechanical design.

The cranked axle itself, apart from any question of multiplicity of parts, or inaccessibility of parts, has never seemed to us a sufficient reason for rejecting inside cylinders. All the world knows that cranked axles have been used in Great Britain and on the Continent since railroads began, and the Englishmen do not seem to be troubled with broken axles any more than we are. With the progress of the art of forging, with the progress in the metallurgy of steel, and with the history of seventy years of railroading, to say nothing of marine history, it does not seem final to say that a design of locomotive otherwise good must be rejected because it has a cranked axle.

The inaccessibility of the parts inside the frames is undoubtedly a valid objection. But it does not seem unreasonable to suppose that with the considerable use of engines so arranged, would come conveniences in the way of pits, etc., for taking care of them. Furthermore, the difficulties would be somewhat offset by the lightness of the divided parts. Finally, we have the great advantage of the practically perfect balance that may be reached by the use of a four-cylinder engine on the DeGlehn system.

Annual Reports.

Wabash Railroad.—The report of this company for the year ending June 30, 1902, shows a continuance of the large increases in gross earnings reported in each of the last half dozen years, the company's gains in revenues, in recent years, as President Ramsey points out, being much larger comparatively than on the other roads of the Wabash territory. Gross earnings are now reported as \$1,499,000 larger than in the 1901 fiscal year, bringing the revenue for the first time to \$19,053,493 from the operation of 2,438 miles, this figure comparing with \$11,526,787 in 1897 when 1,936 miles were operated. Within this period gross earnings have risen from \$5,053 per mile to \$7,815 per mile, while net earnings have increased only from \$1,832 per mile to \$2,135 per mile. The relatively light gain in net earnings which has marked the operation of each year during which this record of heavily increased gross receipts has been made, was as noteworthy a feature in the past fiscal year as in any preceding year, the company saving only \$361,906 of its enhanced revenue in 1902 as an addition to net earnings. The operations of 1902, however, were in marked contrast to any of the years of the recent past in that the tonnage movement was

less than in the preceding year and the gain in gross earnings is attributable most largely to the growth of passenger traffic.

The decrease in the ton-mileage was obviously attributable to the shortage in corn. In corn hauled the loss was 351,000 tons to 560,000 tons, or about 37 per cent., and in all grains the loss was 645,000 tons, or, approximately, 30 per cent. Comparisons of the company's revenues in the past two fiscal years are shown in the following figures:

	1902.	1901.	Increase.
Average miles worked...	2,438	2,360	78
Passenger earnings....	\$5,780,241	\$4,982,094	\$797,547
Freight earnings.....	11,763,541	11,158,966	604,575
Total gross earnings...	\$19,053,493	\$17,554,465	\$1,499,028
Operating expenses....	13,847,436	12,752,045	1,095,391
Oper. exp. and taxes....	14,475,366	13,388,244	1,187,122
Net earnings.....	\$4,578,127	\$4,216,221	\$361,906
Total net income.....	4,895,415	4,478,402	417,013
Interest on funded debt	2,964,757	2,760,571	204,186
All charges.....	3,900,455	3,631,140	269,315
Debt dividend.....	210,000	210,000	—
Additions to property..	583,500	544,126	39,374
Surplus.....	\$201,460	\$93,136	\$108,324

The changes in operated line were more than usually significant. Over 242 miles were built or acquired, the acquisitions including the purchase of the Omaha & St. Louis of 144 miles; of the Boone County & Booneville Railway, of 22 miles, and the construction of two new sections of line in Ohio amounting to about 76 miles taking place in part of the Eel River branch of 94 miles whose operation was suspended in December last, that line having since passed into the control of the Pennsylvania Railroad. The Wabash operated on June 30 last 2,483 miles, or 116 miles more than a year ago. The changes and additions to the mileage in the past year give the company its own lines through from St. Louis to Omaha and from Toledo to Chicago, providing direct through short lines of a control of traffic which could not be had when the company was working through connections whose own interest was, Mr. Ramsey points out, to a certain extent adverse.

In various parts of the report President Ramsey emphasizes the increase in expenses and looks forward to increased cost of railroad working as an element very difficult of regulation, both because of the needs of costly improvements and through the higher wages and other enhanced operating charges. The charges in the operating expenses of the Wabash Railroad in the past year are shown below:

	1902.	1901.	Increase.
Maintenance of way....	\$2,740,901	\$2,335,371	\$405,530
Maintenance of cars....	1,244,087	1,457,151	*213,061
Motive power.....	4,294,889	3,909,316	385,573
Conduct. transportation	5,249,038	4,765,999	483,039
General expenses.....	318,521	284,208	34,313
Total operat. expenses	\$13,847,436	\$12,752,045	\$1,095,391

*Decrease.

The increase in operating expenses shown above was 8.58 per cent., the increase in maintenance of way charges alone being 17.32 per cent. over those of 1901, and \$844,772, or 44½ per cent. over 1900, the increase in the mileage in this period being only 6.13 per cent. The Wabash Railroad reorganization plan of 1889 made no provision whatever for the issue of funds which could be used by the company for necessary improvements and additions, so that all the work of this character has had to be provided for out of surplus income. Even at the present time with the heavy increase in the company's revenue it has \$26,500,000 6 per cent. debenture income bonds on which no interest has ever been paid, besides outstanding common and preferred shares for \$52,000,000. The physical improvement of the property and necessary additional facilities for moving traffic made imperative by the great increase in tonnage and passenger movements, has required the constantly enlarging charges for maintenance of the property, which accounts chiefly for the fact that with an increase of \$7,526,000 in gross earnings since 1897 the increase in net has been only \$1,658,500. But, in addition to the direct charges against operating expenses for this improvement work, the company in the past few years has set up a separate item of expense representing expenditures for additions and improvements, this charge having been \$583,500 in 1902 and \$544,126 in 1901.

President Ramsey states that it will be necessary for years to come to use the company's surplus in continuing the physical improvement of the property "until it is in such condition and so equipped that it can be sure of its share of the traffic under any conditions of competition." He outlines certain proposed improvements aggregating \$2,250,000, contracts for work costing \$1,750,000 having been already made, this including \$250,000 for reducing grades at various points between Chicago and Bement from 60 ft. to 25 ft., and \$1,500,000 for new equipment, including 50 new locomotives, of which 30 are freight engines, 50 coaches and other passenger train cars and 500 40-ton steel underframe flat cars. Mr. Ramsey also remarks that from \$400,000 to \$500,000 will be required within the next two years for new shops, pointing out that the company's only shops "worthy of the name" are at Moberly, Mo., the other engine and car shops being now no larger than they were 25 to 30 years ago, most of the machinery old and the buildings so located that additional lands for enlargement are out of the question at the present sites.

The figures of traffic movement would alone indicate how pressing must be the need of the company for increased facilities of all kinds. Since 1895 the freight-tonnage movement had practically doubled, increasing in this period from 1,101 million ton-miles to a total of 1,947 million ton-miles in 1902, with an increase in the passenger-miles even relatively much larger, or from 13,912

millions in 1895 to 322½ millions in 1902. With this doubling of the ton-mileage the increase in freight-train miles has been only 596,000, or from 6,245,000 to 6,841,000 in 1902. Certain of the traffic statistics in the past year follow:

	1902.	1901.	Increase or decrease.
Tons coal moved	2,197,500	1,710,656	Inc. 486,850
Total rev. tons moved	8,578,603	8,354,949	Inc. 223,654
Rev. tons 1 mile	1,947,404,142	1,978,952,453	Dec. 31,548,311
Frt. engine miles	7,401,016	7,675,004	Dec. 273,988
Frt. train miles	6,841,121	6,981,266	Dec. 140,145
Miles empty cars	50,721,670	54,579,744	Dec. 3,858,074
Miles load. cars	129,714,750	129,392,990	Inc. 321,760
Av. freight train haul (miles)	207	215	Dec. 8
No. tons per loaded car	16.69	16.67	Inc. 0.02
Total av. train load	316.38	309.00	Inc. 7.38
Av. rev. train load	285	283	Inc. 2
No. pass. carried	5,109,392	4,943,016	Inc. 166,286
No. pass. 1 mile	322,708,490	264,268,214	Inc. 58,440,276
Pass. train miles	7,691,050	7,237,313	Inc. 453,737
Pass. car miles	37,451,010	34,138,164	Inc. 3,312,846
Av. revenue per ton	1.37	1.34	Inc. .03
Av. ton-mile rev. (mills)	6.041	5.639	Inc. .402
Frt. train mile earnings	\$1.72	\$1.60	Inc. \$.12
Earn. per pass. train mile	0.91	0.85	Inc. .06
Rev. per pass. per mile, etc.	1.791	1.885	Dec. .094

It is thus apparent that, despite the irregularity of the traffic movement and the decrease in the freight movement in 1902, the operating management found it possible to continue the economies in train handling which have marked the operations of the past year, the decrease in the freight-train mileage having been 2 per cent. as against the decrease of 1.59 per cent. in ton-miles. There was an increase in the freight-train mile earnings aided by the higher average rates of 12c., a larger increase than reported in the previous fiscal year, when there was a very considerable increase in the tonnage movement.

Denver & Rio Grande.—The annual report of this company for the year ended June 30 last, includes in all its accounts and operating statistics the combined operations of the Denver & Rio Grande Railroad Company proper owning about 810 miles of line, and also the operations of the Rio Grande Western Railway, which has now been to all intents and purposes merged into the Denver & Rio Grande Railroad Company which has issued its own stock and securities in the acquisition of all the outstanding capital stock of the Rio Grande Western Railway. This operation was practically carried through in the fiscal year ended June 30, 1901, but the merger has been made complete in the past year. The statistics for 1901 have not only been revised in order to make proper comparisons between the last two years, but the tables of the report containing comparisons of the mileage, earnings and other operations of the Denver & Rio Grande Railroad for 10 years past have also been likewise revised for all the years to include the Rio Grande Western operations. The consolidated system in 1902 had the largest traffic and revenues reported by the two lines in any year, but the increase in gross operating revenues (\$677,218, or 4.14 per cent.), was chiefly due to higher passenger earnings, and is not as large as the gain of \$1,206,323, or 11½ per cent. in 1901 by the Denver & Rio Grande Railroad Company as formerly operated. But it was possible to operate the combined system more economically than in the previous year, so that there was an actual decrease of \$15,594 in operating expenses exclusive of taxes, these charges being 60½ per cent. of gross earnings as against 63¼ per cent. in 1901. The net operating income therefore was \$6,705,286, an increase of \$692,812, or 11½ per cent.

This income provided the 5 per cent. dividends on the larger outstanding preferred stock, \$20,750,000 of this stock having been issued in the acquisition of the Rio Grande Western Railway's \$17,500,000 capital stock. The surplus was \$862,525, after deducting \$120,000 set aside for a renewal fund in accordance with the practice of previous years. This fund in the past year provided for the payment for 100 new standard gage coal cars and 150 standard gage ballast cars. In addition the company appropriated as a charge against surplus \$500,000 for other new additional standard gage freight equipment.

The 1902 figures show a growth in revenue over 1897 (since which year the gains have been continuous each year), of over 80 per cent., the increase having been from a total of \$9,413,619 in 1897 to \$17,036,828, with an increase in this period of 135 miles in operated road.

Gross earnings per mile have risen from \$4,256 to \$7,259 in 1902, and net earnings have increased from \$1,688 to \$2,857 per mile. These figures of earnings per mile compare very favorably with those reported by the larger systems extending out of Chicago. The St. Paul Railway, for instance, in the 1902 fiscal year reported gross earnings of \$6,906 and net earnings of \$2,334. The Denver & Rio Grande Railway's high ton mile rate of 1.22 per cent. in 1902 would, of course, account in part for its high earning capacity per mile; but, on the other hand, it is to be noted that 920 miles out of the total of 2,391 miles operated is narrow gage line, and only 35½ miles of line is double track.

The reported decrease in operating expenses of \$15,594 hardly gives a correct measure of the economies which have become possible by the consolidation of the two lines; because, in the first place, the introduction of economies necessarily takes a considerable time, and, secondly, a good deal more was spent upon the property

than in the previous year. Maintenance account, in fact, shows an increase of nearly \$90,000; the decrease in the cost of conducting transportation was \$42,400, while general expenses were reduced by \$68,285, the saving in these two accounts being \$110,685. Savings in salaries of general officers accounted for \$50,400 of this, and reduction in salaries of clerks, etc., for \$10,600 more, while law expenses were \$11,000 less, and there was a saving of \$10,300 in insurance paid, the Denver & Rio Grande Railroad writing its own insurance policies, having established an insurance fund for this purpose some years ago by appropriations out of income.

For the first time since 1898 the annual report contains a summary of the principal operating and train statistics, these showing considerable economy in handling tonnage despite a decrease in the average freight train haul. The saving in the mileage of empty cars is especially noticeable, and with an increase of about 18½ million ton miles there was a saving of 362,000 freight train miles as compared with 1901, with the resulting increase in the average tons per train of about 17 tons to a total of 99½ tons. The leading operating statistics are summarized below:

	1902.	1901.	Increase or decrease.
Tons moved	6,507,124	5,736,062	Inc. 771,062
Tons one mile	998,010,972	979,498,415	Inc. 18,512,557
Frt. engine miles	6,762,078	7,113,668	Dec. 351,590
Frt. train miles	5,003,145	5,365,814	Dec. 362,669
Miles empty frt. cars	34,539,757	35,266,950	Dec. 727,193
Miles loaded frt. cars	67,283,901	67,782,979	Dec. 499,068
Total miles, frt. cars	101,823,658	103,049,929	Dec. 1,226,271
Passengers carried	1,356,001	1,137,792	Inc. 218,209
Passengers 1 mile	179,843,295	146,582,093	Inc. 33,261,202
Pass. train miles	3,554,892	3,432,441	Inc. 122,451
Frt. train-mile rev.	\$2.43	\$2.26	Inc. \$.17
Pass. train-mile revenue	\$1.04	\$0.913	Inc. \$.127
Ton-mile rev., etc.	1.22	1.24	Dec. .02
Av. tons per train	199.5	182.5	Inc. 17.0

An increase of \$2,400,000 in bonds outstanding really represents the only significant change in capital accounts other than the increase of preferred stock on account of the acquisition of the Rio Grande Western in the 1901 fiscal year. The sale of these bonds was made very largely to provide for the purchase of new equipment, the company having ordered during the year 55 locomotives, 20 coaches, 3,750 freight cars, and other rolling stock, at an approximate cost of \$4,072,000, of which there had been delivered and paid for in the fiscal year equipment costing \$2,165,908, of which \$1,562,108 was carried into capital accounts and the balance paid for by the special appropriation of income and out of the renewal fund. No expenditures for the Denver & Rio Grande Railroad were charged to capital account except for this new equipment, although the first standard gage mileage was increased by 18 miles in the year and other important improvements were carried on. Betterment work was even more extensive on the Rio Grande Western Railway, and the plans for modifying its grades and alignments, rebuilding bridges, etc., are extensive. For such work in the past year \$680,132 was charged against the capital account of that company, and \$698,868 for new equipment provided for by the sale of its bonds in 1901.

Though no charges were made against the capital account of the Denver & Rio Grande Railroad except for equipment as noted above, the company in the past year was interested in the building of considerable new branch mileage and a good deal of new line was under construction at the close of the fiscal year. The construction of about 179 miles was undertaken and 42 miles is reported completed. The most important line is the Castle Valley cut-off on the Rio Grande Western Railway, which will be 116 miles long and afford a shorter route by about 38 miles than the present line to the coal fields in Utah. But this cut-off will be built only from time to time as the developments in the territory traversed demand. This and the other lines are built under the charters of subsidiary companies, to which the Denver & Rio Grande has made advances, or under agreements with shippers benefited by the new branches.

Illinois Central.—There is in New York a financial writer who may always be depended upon for an epigram, and who can be wise without being dull. The other day we heard him say, "Bad management is an asset, for it may be improved. The management of the Illinois Central is a bull point." This suggestion that the management of the Illinois Central is not using its resources with up-to-date skill, has been repeatedly made in the last few years by a few writers; but we are not altogether satisfied of the justice of it. In this year's report of the company appears a new table, Table 8, from which we shall take some figures later. It seems possible that this table is designed as at least a partial answer to the charge of which we have spoken above.

Whatever may be the justice, or the injustice, of the fashionable suggestion of bad management, the Illinois Central this year shows a considerable improvement over any preceding year. The traffic earnings amounted to 40.8 million dollars, and the income from traffic was 12.8; adding to this, income from investments and miscellaneous profits the excess of income over working expenses and taxes was 16.36 millions. After the payment of fixed charges and of dividends of 6 per cent., to the amount of 4¼ millions, and after setting aside for betterments almost exactly 5 millions, there was carried forward to the surplus dividend fund \$1,132,000.

Practically all items of income increased. The freight income was 11.39 per cent. larger than in the preceding

year, and the total operating income was 10.62 per cent. larger. Working expenses increased 8.23 per cent., and net revenue, taking out working expenses but not taxes, increased 15.21 per cent. This is the broad statement, but a few particulars will be interesting and will give a basis for comparison which will be of some assistance in deciding as to how far the company is using that asset of which the financial writer spoke. It is well known that the company has been spending great sums of money in the last few years for terminals at both ends of the line, for track revision and double-track, for renewal of structures and for new and heavy rolling equipment. The question is now whether or not the management is making reasonable and adequate use of the facilities so acquired.

In the year to June 30, 1902, the total ton-miles carried amounted to 5,263 millions, including company freight. This was 12.07 per cent. more than in the preceding year; but the freight train-miles were actually 8.12 per cent. less than in the preceding year. The freight train load was 324.78 tons, an increase of 18.10 per cent. The revenue freight train load was 274.75 tons, an increase of 16.83 per cent. The average number of loads in a train was 18.47, an increase of 13.45 per cent.; and the empties decreased 6.8. If we go back to 1898, for example, we find that the train load was 206.17 tons, and the average number of loads per train was 16.25. In the four years a very substantial gain had been made.

Of course, another measure of efficiency is in the earnings per freight train mile, although naturally this must depend a good deal on the rate secured, a matter quite out of the control of the transportation officers. In 1902 the gross earnings per freight train mile amounted to \$1.71. The year before it had been \$1.46, a gain of 17.4 per cent.; but the ton mile rate had only risen from 0.619 ct. to 0.622 ct. As a matter of curiosity we may go back to 1897, when we find that the freight train mile earned only \$1.30, and in the year before it had earned \$1.35, because of the higher average rate. Measured by this standard, again, the progress seems reasonable. Whether or not it is adequate, whether or not somebody else could make faster progress, must be a matter of judgment based upon a knowledge of facts such as we do not possess; but in judging of the train loads one must remember that the Illinois Central has a large tonnage of perishable freight which must be carried in light trains. A road carrying bananas can hardly be compared with a road carrying coal to tide water or to the lake ports. But from what we know personally of the transportation officers and of their work we judge that they are developing the capacity and the use of the property with skill and energy, and the management may be a "bull point" in quite another sense from that in which our humorous friend uses it.

The new table of which we spoke gives passenger-miles, ton-miles, the sum of these, and the miles worked, for 14 years, beginning with 1889. The sum of the passenger-miles and of the ton-miles is called the unit of service, and the number of these units of service per mile worked, measures the traffic density, or the service to the public. This has grown steadily every year since 1889, having increased 2.55 times. The greatest increase was in the year 1900, namely, 134,427 units, and last year the increase amounted to 33,429 units.

There is much other important information concerning finance, standards of maintenance, etc., but we have space for only a word about permanent improvements. In betterment the sum spent last year was a little over \$8,000,000; of this \$4,340,000 was out of current income, and \$3,489,000 was charged to capital.

Yazoo & Mississippi Valley.—Although gross receipts from traffic increased from \$6,127,942, in 1901, to \$6,587,556, for the fiscal year ending June 30, 1902, (which is \$6.014 per mile of road for the current year, as against \$5.800, last year) the surplus shows a decrease of \$200,325 from \$1,066,079 reported in 1901. The difference is mainly in operation expenses, to which were charged, during the year, \$1,139,179 for maintenance of way and structures (a considerable increase over the figure for 1901), and \$642,921 for maintenance of equipment. The increase in these two items is \$296,805, or nearly \$100,000 more than the decrease in surplus. The failure of the corn crop of 1901, and the reduction in the exports of corn through New Orleans from 20,948,253 bushels, during the year ended June 30, 1901, to 2,159,531 bushels in the current year deprived the company of a large tonnage from Memphis to New Orleans. The President also points out that the competition for export grain is very severe, and it is necessarily carried at low rates. Yet the average receipts per ton-mile increased to 0.972 cent, as against 0.831 cent in 1901. Revenue ton-miles were 476,644,147, as against 489,184,635, in 1901, and passenger miles increased from 55,347,045 to 57,353,516 in the same period. A comparative statement of operations follows:

	1902.	1901.
Miles worked	1,095	1,056
Revenue ton-miles	476,644,147	489,184,635
Company's freight, miles	49,214,925	34,324,239
Passenger-miles	57,353,516	55,347,045
Gross receipts	\$6,587,556	\$6,127,942
Gross, per mile	6.014	5.800
Operating expenses	4,422,674	3,757,895
Expenses, per mile	4.038	3.556
Ton-miles per mile	435,164	463,019
Passenger-miles per mile	52,362	52,387

In consideration of the fact that the average weight of rail in main track is 59 lbs. and the heaviest is 75 lbs., it would seem that there will, before long, be necessity of considerable expenditure in betterment of track. Little is said about equipment, but it may be assumed that

the cars are small according to modern notions since the average train load of both revenue and company freight is a fraction over 237, and the average number of cars is 23.

August Accidents.

We publish in another column of this issue a condensed record of the principal train accidents which occurred in the United States in the month of August. The record contains accounts of 33 collisions, 36 derailments, and 3 other accidents. Those which were most serious, or are of special interest by reason of their causes or attending circumstances occurred as follows:

3d, Horton's, N. Y. †19th, Belmar, N. J.
3d, Los Angeles, Cal. †24th, Georgetown, Ind.
6th, Rhodes, Iowa. †30th, Meriden, Minn.
12th, Elizabethport, N. J. †30th, Stanwood, Iowa.

The accidents which were fatal to passengers were the collisions at Belmar and Stanwood, and the derailment at Meriden. The last named appears to have been due to an act of God which even His Britannic Majesty's Board of Trade would probably find it difficult to suggest a remedy for. The collision at Belmar was not one of the worst kind, and the persons killed appear to have been outside the cars (getting on or off); but the cause was one of the worst kind. The coroner's jury censured the men in charge of the moving train, and also censured the railroad company for not having had the block system in force. At Stanwood the block system was ostensibly in force; but the signalman or the engine-man failed in his duty. The reports say that the signalman (telegraph operator) gave a clear signal when he should have given a caution signal, the preceding train being still in the section.

The collision at Rhodes also occurred on a line where the block system is usually in force, but where, it seems, it is suspended on occasion. In this case the coroner's jury, having found that the collision was due to a misunderstanding between the two conductors, says nothing about responsibility or negligence or misconduct; and the local reporter sagaciously observes—reflecting, no doubt, the views of the jurymen—that the accident was "due to a misunderstanding between two conductors and was not the fault or carelessness of anyone." This much having been written, it was easy, of course, for the telegraph editor to evolve the following head lines (we quote from the *Des Moines News*):

NO ONE TO BLAME FOR WRECK.

Coroner's Jury in Milwaukee Fatalities Exonerates All. The final impression on the public mind, therefore, must be highly edifying—collisions killing half a dozen men can occur by mere misunderstandings, not susceptible of investigation, and nobody to blame. Fortunately, however, the real business of investigating collisions and of preventing their recurrence, does not depend very much on coroners, coroners' juries or reporters.

The drawbridge accident at Elizabethport was not on the main line; but it affords a good illustration of the value of a derailing switch or a sand track. The Georgetown collision, caused by cars running away, is one of a class that seems to have occurred rather frequently of late. Unless we are going to adopt the principle of putting catch-points in all main tracks on grades, nothing but eternal vigilance will prevent disasters like this one. It is scarcely imaginable that the automatic air-brake could be made a more efficient stopping device than it now is; but we must not expect it to do everything. Cars standing on a grade, either on the main track or in a position from which they can run to the main track, may be said to have constantly stored up in themselves a large amount of danger, under high pressure; and only the intelligence, care and faithfulness of conductors and brakemen can keep this danger from manifesting itself. This one feature of freight-train work—the controlling of cars when they are on steep grades, detached from the engine, and when they stand or may stand in such a position a considerable time—ought to be enough to keep any superintendent from tolerating in that service any but the most thoroughly trained men and from permitting the men to work too long hours. This observation is suggested by the last Government bulletin, wherein it appears that some of the worst collisions happened to trains which were in charge of men of very limited experience.

The number of street-car accidents reported in August was 28, in which 14 persons were killed and 130 were injured. Two of the fatalities (passengers) are chargeable to a rear collision on the Albany & Hudson, the same road that had a bad butting collision not long ago. It is reported now that the company will adopt the block system. Three persons were killed in a butting collision near Norfolk, Va., said to have been due to disregard of meeting orders; and one passenger was killed in a panic where the car suffered hardly at all. The trolley wire broke; and in falling, it flew around the car in such a peculiar and startling manner that the passengers became panic stricken and ran for the doors. Eight of them were injured.

An electric railroad is a very different thing from a steam railroad. Again, a railroad is a railroad, whatever the motive power; hence why should there be any difference in the treatment of a railroad company by the public merely because its vehicles are propelled by energy developed rotatively instead of reciprocally? These two statements will suggest numerous familiar puzzles which are now engaging the attention of railroad commissioners, tax

assessors and other state and municipal officers. The editor also has his troubles; what names shall he use to designate railroads part steam and part electric? What is a line that is partly in a city and partly in a pasture? Urban and interurban are not very pretty words. The term "street railroad" does not seem appropriate for a track covered out of sight, in weeds a foot high, in the wilds of Michigan or Maine. What is a railroad crossing? President Roosevelt's attendant was killed at a crossing; and yet it was in the middle of a highway and remote from any "railroad." These conundrums are suggested by an insignificant item from Grafton, Mass. The Grafton & Upton, a steam railroad, has lately put up a trolley line, and now runs electric cars in place of its former one-car passenger trains. It appears that under the new arrangement no flagmen are maintained during the day at the grade crossings with highways, although in the night, when the freight trains, run by steam, are in operation, the flagmen are on duty. The president of the road says that the electric cars are always stopped before crossing a highway, so he claims that no flagmen are needed. The state railroad commissioners are going to investigate the matter. To the distant observer the curious thing about this episode is that a road 16 miles long through a thinly settled country, running two freights each way per night, finds it necessary to keep flagmen on duty at all. We should think it would be cheaper to have the freight train men flag themselves over the crossings. From an economic point of view, and judging solely by the interest of the public, a railroad running only a very few trains ought to be compelled to run slowly enough at crossings to avoid danger without having flagmen, for it seems absurd to keep a man on duty eight, ten or twelve hours, or even half that time, when his work requires his attention only eight, ten or twelve minutes. The company ought to spend its money to better purpose. Conditions something like those at Grafton are observable at little-used crossings in many places.

Leaky Flues.

(Continued From Page 741.)

do not think there was one of them but what was leaking very badly inside of a week after we got them. We rolled the flues, giving them the usual roundhouse work; sometimes they would remain tight and sometimes not. We found, however, after a year's use that a large part of the leaky-flue question was in the handling of the engine. After a man got to know how to fire the engine and the engineer how to handle the engine, the leaky-flue question was very much better, and towards the last flues that had been in 16 and 18 months were giving very little trouble during the warm weather.

Mr. Bentley has said that it does not make any difference whether the flues are made of wrought-iron or steel, or whether they were well set or poorly set, they would leak any way. Now, that is not my experience. I believe that if a flue is understandingly set and well set, that very much longer service can be obtained, no matter whether water is poor or not. I am thoroughly convinced of that.

Mr. C. H. Doeblér (Wabash): We had considerable trouble when we first got our large and heavy power, from leaky flues, and I think that a great amount of the trouble was traceable to the fact that the engines were not properly handled by the engine crews. Since the engine crews have become accustomed to the engines and firemen educated to the matter of throwing the coal in the proper place, our flue trouble has almost entirely disappeared.

We also are particular in taking care of the engines on the ashpits. As soon as the fire is drawn the dampers are closed; when the engine is put in the house, we cover the stack to keep the sheets from cooling down too quickly by the cold air rushing through.

Mr. J. A. Carney (C. B. & Q.): I think the place to purify the water is before it goes into the boiler and not after. We have tried a great many methods of purification in the boiler, and none of them proved satisfactory, for the reason that the scale-forming material forms a deposit as mud, and we have to wash this mud out. What we want to do is to get rid of that mud and scale-forming material before it gets into the boiler and not try to give the boiler a dose of physic to cure it up afterwards.

Mr. E. B. Thompson (C. & N. W.): It seems to me that after everything is said and done, the only method of effecting a cure is to purify the water before it goes into the boiler, and I think until that is done, the leaky flues will be always with us.

Mr. Miller: It seems to be the general consensus of opinion that bad water is the cause of all our flue troubles. I do not think there is any question about it whatever; there cannot be. We all know from hearing those that are in the good-water districts tell us that they do not have any trouble with the flues; and everybody that is in what you call bad-water districts has grief all the time.

A good deal has been said to-day about the cold air coming up against the flue sheet. I do not think that in the good-water districts the firemen and engineers are any better than they are in the bad-water districts; I think there is just as much cold air gets into the fire-box in the good-water districts as in the bad-water districts, but they do not have leaky flues in the good-water districts, therefore the conditions as far as that part of it is concerned must be found somewhere else; and it still lies in the water.

Now, my personal theory about the cause of flues being leaky in the bad-water districts is two-fold. In the first place, there is bad circulation on account of the scale which accumulates around the flues; particularly at the bottom of the boiler there is more or less accumulation, and anybody that has seen a set of flues knows that the bottom 50 to 75 flues are generally solid with mud; the place is frequently filled solid. That causes an irregular heating of the flue which is not conducted to the water; it makes it expand more or less irregularly, and I think produces more trouble than anything else. In the second place, after a flue has once leaked in bad water, there is a thin coating of lime which accumulates between the sheet and the flue and keeps it from making a joint, and after that it is an impossibility to have that flue tightened without removing it; you cannot get that lime out.

In some of our bad-water districts we use soda ash to neutralize to some extent the scale making tendency of the water. It is a curious thing that when we started we had the most awful epidemic of leaky flues; we thought our boilers were all going to play out at once. However, we kept at it, and in a short time the flues got very much better. The stationary boiler in one of our plants that had not had tight flues for more than two months, and on which we were going to remove the flues entirely, was treated in this way, and it was but a short time until the flues were perfectly tight, and if I am not mistaken those flues have not been taken out since, and that was over three years ago, showing that the lime between the flue and the sheet was what kept the joint from being made.

Mr. Vaughan has raised a question which is one of the most serious things that has to be contended with, and that is in regard to the wide fire-box engine. Our experience, as far as I am acquainted with it (the wide fire-box engines are not running in my territory very far) is that the wide fire-box engines do not leak any worse than the narrow fire-boxes at the same steam pressure; in fact, we have had them leak worse than the wide fire-boxes that are carrying no higher steam pressure than 205 lbs.

In regard to the brick arch question that Mr. Vaughan raised, of putting it up against the flue sheet, I do not believe he will be able to make a success of that. My own experience with the brick arch is very satisfactory, using it in deep fire-box engines; we find it requires space of from 2½ to 4 in. in order to get the engines to steam fully, and I do not see any reason why it should be different on a wide fire-box engine.

Mr. Vaughan also raised the question of wider spacing between the flues. I believe there is one solution of a great deal of our trouble, because we get better circulation. A year ago this month I took out of a boiler that worked under 116 to 135 lbs. pressure the 11 center flues, reducing the heating surface about 10 per cent., and as we put in a new flue sheet, it made no difference whatever. That engine was in an accident the other day, and was sent up for repairs, so that we examined the flues and they were cleaner than in any engine that was in the yard at the same time. It was never known to give any trouble, and had been calked less than any other engine that had been in the shops for two years. Altogether the results were so satisfactory that I think it is a very good plan. I think we can let that engine run another year before we reset the flues. That left about 3 in. of space between the flues, so that we could get at the other flues to wash them out.

Now, in that particular engine the flues were arranged in a bad way. You will all remember probably that in the latter class of engines frequently the water has to travel nearly in a circle, while if that arrangement is turned half way around it has only to travel a semi-circle. I am going to recommend putting the flues in one of those boilers such as they put in stationary boilers, using a 2 in. instead of a 2½ in. flue, practically the same heating surface, and allowing ¾ in., or a narrow space between the flues, all in line with these ideas. I feel that with that and also with the 4-in. space left in the center, that we will have engines with flues that will run, I was going to say indefinitely, at any rate that will compare with the other results.

NEW PUBLICATIONS.

Transactions of the American Institute of Electrical Engineers. Volume XVIII. Large octavo, 1,054 pages; index; illustrations.

This volume is the official report of all of the regular meetings of the Institute during the year 1901, and also of the eighteenth annual convention, held August, 1901, at Buffalo. The list of papers and discussions is much too long to be given here, but the volume is a fairly complete record of a year of electrical history, and of the advancement of the electrical art during the year. It may be had from the Secretary of the Institute, Mr. Ralph W. Pope, at 95 Liberty street, New York City. The price of the volume (bound in cloth), to others than members, is \$5.75.

Universal Directory of Railway Officials. Published by the Directory Publishing Co. Ltd., London, United States: E. A. Simmons, Sole Representative, 1233 Broadway, Brooklyn, N. Y. 8vo., pages 639. Price \$2.50.

This work is familiar to those having occasion to correspond with foreign railroads. The volume contains a list of the railroads of the world together with the mileage, gage and equipment, and the names and addresses of officials, and alphabetical indexes to the countries,

railroads and officials referred to in the body of the book. The edition just from press represents the eighth year of publication and is 16 pages larger than last year's book.

The Manual of Business. By Sidney P. Johnston. Octavo, 263 pages; index. Chicago: Daniel Stern. This volume belongs to the American Artisan Manuals, brought out by the American Artisan, Chicago, and is a collection of business forms for executing all commercial instruments, and of commercial data, and contains advice on questions constantly arising in everyday business life.

Proceedings of the Air-Brake Association, 1902.—The Proceedings of the Pittsburgh meeting of the Air-Brake Association has been received in the customary form and binding. Abstracts of the reports and also of the discussions have already appeared in our columns. The 1902 Proceedings has 183 pages and may be had on application to the Secretary, Mr. F. M. Nellis, 218 William street, New York.

TRADE CATALOGUES.

The Link-Belt Machinery Co., Chicago, issues a pamphlet describing the Renold high-speed silent driving chain. There are numerous half-tone illustrations showing the various applications for which this chain may be used, the engravings being made from photographs of chains and sprockets in actual service. We are also told why the ordinary drive chain is noisy and the Renold is silent, and the reasons for its superiority over belting spur gearing, etc., are enumerated. The Link-Belt Companies have sole charge of the application of this chain.

The Star Brass Works, Chicago, sends us a pamphlet devoted to a description of the various styles of whitewash and painting machines of which the company is sole maker. Their simplicity of design and effectiveness of service are described, and directions for operation and for making mixtures for whitewash are given. A leaflet relative to Bink's fire-proof cold water paint, which may be applied with a Star machine, is also enclosed.

Pintsch Lamps.—The Safety Car Heating & Lighting Co., 160 Broadway, New York City, (also Chicago and St. Louis), have issued a pamphlet of 34 pages, made up almost entirely of pictures of lamps for Pintsch gas and combination gas and electric lights for railroad cars. Some of the designs are new, and of these new designs all are handsome and some are beautiful. A style quite different from anything now in use presents the whole lamp in the form of a globe, and it is very compact and symmetrical.

A Color Chart.—An ingenious card device, for displaying the colors of Dixon's Silica-Graphite Paint in such manner as will permit of an exact idea of each color, is being issued by the Joseph Dixon Crucible Company, Jersey City, N. J. The color chart carries with it suggestions as to the class of construction that can be protected with this paint, also instructions as to best methods of applying protective paint. The new color chart can be secured by request to the Joseph Dixon Crucible Company, Jersey City, N. J.

A British View of our Rail Joints.

We published the other day (page 698) some notes from Colonel Constable's report on American railroads made as the result of his visit to this country in the interest of the Indian railroads.

Concerning our rail joints he thinks that the best is that of the New York Central & Hudson River Railroad; namely, a three-tie joint, 36, 40 or 42 in. long, with six bolts. He says that the joints could not be felt even where the rails had been down since 1892, and had carried 125 million tons of traffic. He suggests that this joint should have an exhaustive trial in India, but he would like to see the fish-plate a little thicker, and the tie plates used on the ties. The angle plates, of which he got particulars on the New York Central, are of 55,000 lbs. elastic limit.

He thinks, also, that the Indian railroads should try a joint which he saw on the Pennsylvania Railroad, being a "modified Bonzano joint," the modification of which he shows being greater length, so as to make a six-bolt instead of a four-bolt joint. "I think the joint is a good one and is vertically strong, but all the same I have a predilection for the sleeper under the joint." The New York, New Haven & Hartford joint is a four-bolt angle joint suspended and "it is weak and the joints are down even with the 100 lb. section rail." The "Continuous" joint he thinks is vertically weak for the weight of metal put in it, but he found that it was highly approved of on the Philadelphia & Reading and the Baltimore & Ohio.

Incidentally he looked at oil ballast, and got some information about it, and thinks that it ought to be tried in India.

New Railroads in Asia.

The great railroad in Asiatic Russia from Orenburg to Tashkend, about 1,200 miles, will give an all-rail connection between European Russia and its Asiatic Midland Railroad, north of Afghanistan. It will pass large-

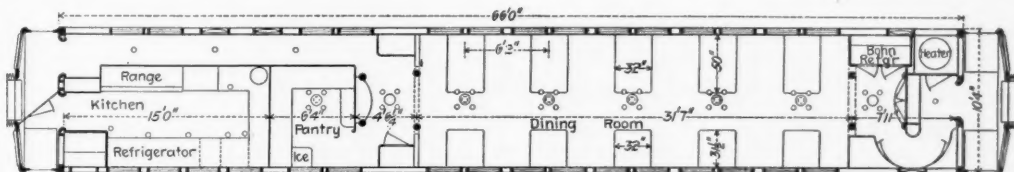
ly through a semi-arid stock-growing country, and further south through irrigated districts where much cotton and fruit is grown.

It has been making rapid progress, though little has been said about it. On the northern half, from Orenburg southeast 300 miles, the roadbed was nearly ready for the rails at the beginning of summer, and 700 men were at work on the bridge over the Ural, 1,120 ft. long. On the southern half wells had been dug and other preparations made for the residence of an army of laborers in a desert country. It was necessary in many places to go down 275 ft. and more to get water, and at one station on the steppe water was not found at a depth of 329 ft.

The Russian newspapers, which in such matters seem to be about as untrustworthy as our own, also speak of a private railroad to be built by English and Moscow capitalists from Tashkend northeastward some 1,350 miles to the Siberian Railroad at Tomsk. This line would for the most part follow the western foothills of mountain ranges, where there is usually sufficient rainfall for agriculture, and not only much fertile land, but valuable mines of coal, iron and copper, some of which were worked in prehistoric times. The best known part of this district, however, is already accessible by river from the line of the Siberian Railroad, and has received many emigrants from European Russia within the last 10 years. The native population on these two lines is not Russian, though long under Russian dominion, and is chiefly Malometan.

The Burlington's New Dining Car, "La Crosse."

The Chicago, Burlington & Quincy has just put in service a new dining car on its St. Paul limited express, leaving Chicago at 6:30 each evening. This car, the "La Crosse," was built in the company's shops at Aurora, Ill., from designs prepared by the mechanical department. It is 66 ft. over end sills, and the dining room has five large and five small tables, providing accommodations for 30 people. The design of the dining room follows the Italian renaissance style, the finish being in San Domingo mahogany, with lemon brass trimmings. The deck is de-



Plan of C. B. & Q. Dining Car "La Crosse."

signed in full empire style with headlining decorations in gobelin green and gold. At each end of the dining room massive disengaged columns, reaching from the floor to the cornice, support the deck.

The window curtain boxes are placed about 10 in. below the tops of the windows and the intervening space is filled with cathedral art glass which adds a pleasing touch of color to the general effect. The car is lighted by electricity, the ceiling fixtures being combination electric light and gas, while each table has an electric candelabra.

The various cupboards and closets for china, silverware and linen are equipped with roller curtains instead of doors, which is expected to add greatly to the convenience of serving.

Foreign Railroad Notes.

At Cologne the work of loading and unloading freight and other freight-station work has been done on the "piece-work" principle with results so satisfactory both to the employer and the men that the extension of this method is strongly advised. The railroad authorities, however, are cautioned not to introduce the system in the fall, when the superfluous men discharged could find nothing to do, but preferably in the spring, when there is usually plenty of work for everybody.

The train-men on the Belgian railroads have had certain premiums granted them when their trains arrived on time. If they were on time at the end of their run, but had been behind at some way station, the premium was reduced one-half. To be everywhere on time, however, seems to have been found only a standard of perfection, always to be aimed at but usually unattainable; and now the whole premium is given if the train gets through on time.

The average number of employees of the railroads included in the German Railroad Union in 1900 was 885,407, whose aggregate pay amounted to \$249,616,572, or an average of \$276 per man, \$2,683 per mile of railroad, and 50.3 cents per train-mile, and to 32½ per cent. of the gross earnings. The amount paid in pensions to employees and their heirs in the same year was no less than \$16,409,361, or about 6⅔ per cent. of the amount paid for salary and wages, being at the rate of \$18.53 per employee in active service. This is virtually a part of the pay of the men.

The third of the Swiss railroad systems to be transferred to the State was the United Swiss Railroad, which became State property July 1.

TECHNICAL

Manufacturing and Business.

The Utica & Mohawk Valley Electric R. R. has placed an order with the Climax Stock Guard Co., Chicago, for 250 vitrified-clay Climax stock guards.

The Northern Engineering Works of Detroit, Mich., is building a 50 ft. span traveling crane for the Great Northern Railroad; also a five ton electric traveling crane for the Pacific Electric Railroad.

In order largely to increase its facilities the Ajax Manufacturing Company, of Cleveland, has bought the old plant of the Chicago-Cleveland Car Roofing Co., adjoining the Ajax works, adding 10,000 sq. ft. of space to the machine shop and foundry.

R. L. Newman announces that he has opened offices as a consulting engineer and naval architect in the Chesborough building, New York City. He was formerly with the Cramp Company, with the Globe Iron Works, and with the New York Shipbuilding Company.

The Malleable Iron Truck Co. has been incorporated in Minnesota with \$10,000 capital, to make and sell all kinds of malleable iron trucks and similar articles. The office will be in St. Paul, and the incorporators are Harry H. Colestock, Joseph F. Moyer and Geo. J. Freeman.

S. A. Watson, heretofore General Sales Agent of the American Steel Casting Co., has been appointed General Sales Agent for the American Steel Foundries Company, with temporary office at Chester (Thurlock Station), Pa. Later on his office will be in the general offices at 74 Broadway, New York City.

The Detroit Graphite Manufacturing Company in the same mail on Sept. 19 received a very large order for its superior graphite paint from Manila, Philippine Islands, and another order from San Juan, Porto Rico. The company's factory is working to its fullest capacity and overtime to fill current orders.

T. H. Symington, for some time past in charge of the general sales agency of the Gold Car Heating Co., has resigned to devote his time wholly to the interests of T. H. Symington & Co., Baltimore, Md. When Mr. Symington went with the Gold Car Heating Co. it was under-

stood that he was to serve pending the conclusion of a number of tests of journal boxes and dust guards, of which he was the patentee. The results of these tests were entirely satisfactory and the devices will now be pushed.

The Barnett Equipment Co. of America has been incorporated in New Jersey, with \$100,000 capital, by Colonel Edwin W. Hine, of East Orange, and Stephen D. Barnett, of Forest Hill, N. J. It is said the company will make a device to control street railroad cars. The company will have an office at 20 Prospect street, Newark; also at 39 Cortlandt street, New York. Stephen D. Barnett is President; Colonel Hine, Vice-President, and Frederick W. Egner, Secretary and Treasurer; Geo. L. Fowler, Mechanical Engineer; Benjamin W. Tucker, Consulting Engineer.

The Philadelphia Pneumatic Tool Co. states that its business for the month of August was greater than for any month previous and that the sales for the month of September will probably exceed those for August. Amongst others, large orders have been received from the Cambria Steel Co., Pennsylvania Steel Co., New York Shipbuilding Co., Newport News Shipbuilding & Dry Dock Co. and Grand Trunk Railway. Shipments are now under way for Paris, London and Copenhagen. The company has just added to its machine shop equipment eight engine lathes, two automatic machines, two turret lathes, two grinding machines, one Fellow's gear shaper, six drill presses, one Universal drilling machine, one twist drill grinder and a number of smaller machine tools.

Iron and Steel.

The Berkshire Iron Co., with \$10,000 capital, has been incorporated in New Jersey.

A. J. Hughes and A. S. White, of the New Russian Co., operating iron and steel works in Russia, are visiting Canada to study the methods of making steel.

Reports from London that the British rail makers have consolidated to compete with the United States has been denied by several of the companies reported interested.

The car wheel works at St. Louis owned by Hon. John H. Bass, of Fort Wayne, Ind., was sold during the early part of last month to a company headed by John W. Nute, of St. Louis.

The Passaic Steel Co. has been incorporated in New Jersey by Albert C. Fairchild, Henry F. Bell and Frederick F. Searing. The temporary office is at 84 Broadway, Paterson, N. J.

The Marine Engine & Machine Co., with a plant at Harrison, N. J., has increased its capital stock from

\$500,000 to \$2,000,000. The additional capital will be used to extend the present plant.

The works of the West Virginia Bridge & Construction Co., now building near Wheeling, W. Va., are expected to be in operation by Nov. 1. The buildings are being put up by the Penn Bridge Co., of Beaver Falls, Pa.

The Morehead Bros. Co., of Pittsburgh, Pa., last week received the first 800 tons of muck iron of a 5,000-ton order placed with a German firm about two months ago. One thousand six hundred tons more are on the way.

The Phoenix Ship Co. has filed articles of incorporation with the County Clerk at Newark, N. J., showing an authorized capital stock of \$200,000. The incorporators are C. Frederick Smith, Frank R. Hansell and Walter H. Bond.

Cornelius Shields, General Manager of the Dominion Coal Co., has been appointed Vice-President and General Manager of the Dominion Steel & Iron Co. as well. The steel company has had no General Manager since Mr. Moxham resigned last year.

The Court of Errors and Appeals of New Jersey has decided in favor of the United States Steel Corporation in the Berger suit, which sought to restrain the corporation from converting \$2,000,000 preferred stock bearing dividends at the rate of 7 per cent., into 5 per cent. bonds. The Hodge suit is still pending.

The Bellaire steel works of the National Steel Co., at Bellaire, Ohio, on Aug. 20 turned out a total of 1,046 tons of bars and slabs. In that week 5,638 tons of steel were finished, breaking the previous record of one week by 264 tons. The two blast furnaces on Aug. 20 made 790 tons of Bessemer iron. The total output for the two stacks in August was 21,118 tons.

According to preliminary estimates it is said the net earnings of the United States Steel Corporation for August were about \$12,000,000, against \$9,810,000 for August, 1901; and for July about \$12,000,000, as compared with \$9,580,000 for July of last year. It is further estimated that the net earnings for the quarter ending Sept. 30 will be between \$38,000,000 and \$39,000,000. That of the corresponding period last year was \$29,000,000.

Pneumatic Tools.

Mr. J. W. Duntley, President of the Chicago Pneumatic Tool Company, has just returned from a five weeks' trip to Europe. The Chicago Pneumatic has recently taken over the Tait-Howard Pneumatic Tool Co. and the International Pneumatic Tool Co. of England, which have been reorganized under the name of the Consolidated Pneumatic Tool Co., capitalized at \$300,000. Factories are run at 138-148 Tooley street, London, and in Chippenham, Wiltshire, England. The Chicago Pneumatic Tool Co. expects to arrange to duplicate its Detroit plant in Scotland. The exhibition before the Ship Builders' Federation in Glasgow was entirely successful, and pneumatic tools have practically been adopted for all the ship-building work in the Scotland yards. The American workmen making the exhibit of pneumatic tools on ship-building are now in Germany, and from there will go to France. While in France Mr. Duntley took an order for 130 pneumatic riveters for one of the largest French ship yards. As an evidence of the growth of the pneumatic tool business, Mr. Duntley says that his sales in 1895 amounted to \$8,000, while in the current year they will run about \$3,000,000. The Chicago Pneumatic Tool Co. is now operating four of its own factories in the United States, and has two factories under contract manufacturing pneumatic tools. The pneumatic tool plant at Detroit and air compressor plant at Franklin are being run day and night.

Car Lighting.

The Southern Pacific Company, in conjunction with the Rock Island, has adopted the Consolidated Lighting & Equipment Company's system of electric "axle" lights and fans for the new cars to constitute the Golden State Limited, which goes into service between Chicago and California on Nov. 1.

The Simplon Tunnel.

The Swiss government engineers report that the completion of the Simplon Tunnel is likely to be delayed seven or eight months by the unforeseen flow of water in the southern part. Work there is now progressing favorably, but another unexpected obstacle is the high temperature in the northern end, which has been as much as 122 deg. Fahr., where 108 deg. was the highest expected. Still higher temperatures are feared. The arrangements for reducing the temperature have worked very well, and have kept it down where the men are drilling to 77 deg. The highest temperature found in the Gotthard Tunnel was 113 deg. The tunnel contractors have given it as their opinion that the increase in cost due to unforeseen circumstances will amount to about \$200,000. The contract calls for the completion of a single-track tunnel, with a parallel tunnel for working, for \$10,900,000; and to enlarge the parallel tunnel, if required, for a second track, for \$3,100,000.

The Pittsburgh Spring & Steel Co.

We have already noted the organization of the Iron City Spring Company and the election of officers. It has now been succeeded by the Pittsburgh Spring & Steel Co., incorporated under the laws of Pennsylvania with a capital stock of \$500,000. The officers of this company are: President, D. C. Noble, formerly Secretary and Treasurer of the A. French Spring Co.; First Vice-President, T. H. Given, President Farmers' National Bank, Pittsburgh; Second Vice-President, L. C. Noble, formerly

Western Manager A. French Spring Co., Chicago. The Directors are: D. C. Noble; T. H. Given; Henry Aiken, President, Hydraulic Machine Co., Pittsburgh; James Neale; H. K. Porter, President H. K. Porter Co., Pittsburgh; L. C. Noble and Thornton N. Motley, President Thornton N. Motley Co., New York. The company will make all kinds of steel springs, making a specialty of elliptic and coil springs for locomotive and car service; also for traction cars, machinery, valve, governor and other requirements. It has bought the Fifty-third street plant of the Pressed Steel Car Co. in the city of Pittsburgh, consisting of five acres of land, with suitable buildings, and will be ready to deliver orders after Jan. 1. The capacity of the plant will be greater than that of the A. French Spring Co., and in addition the company contemplates, in the near future, to roll its own steel. The Pittsburgh office is 200 and 202 German National Bank Building, and the Chicago office is 701 Fisher Building.

The Richards Reclining Chair.

The Richards Chair Panel Co., Chicago, has just perfected a reclining chair for passenger coaches, which embodies the distinctive feature of the Richards chair, namely, the panel back; and in addition is equipped with an extension leg rest having a side motion, which will permit the passenger to use the unoccupied space on either side of the chair in front of him. It is claimed that these chairs occupy less floor space than others, being placed 40 in. centers, which allows passengers ample room. A 70-ft. coach will accommodate 64 Richards chairs and four cross seats, giving seating for 72 people without crowding. These chairs are being made for the Richards Company by the Pullman Company.

Report on Disappearing Gun Carriages.

The Secretary of War has approved the findings of the Board of which Col. Wallace Randolph, Chief of Artillery, is President, which has been conducting tests during the summer of disappearing and barbette gun carriages, as previously mentioned in this column. After extensive tests the Board unanimously recommends that the making of the Buffington-Crozier disappearing gun carriages be continued for the 8-in., 10-in. and 12-in. guns, but recommends that no more 6-in. guns be mounted on disappearing carriages, as it is essential that the rapid fire guns be mounted on barbette carriages. The Board gives the results of the tests and its own observations and conclusions in great detail, the tests having been made in accordance with a provision of Congress that no more disappearing carriages be ordered until reported on by such a board. (July 25, p. 596.)

Baltimore Bridge Company.

The Baltimore Bridge Co., organized recently under the laws of Delaware, has bought the entire business of the Structural Iron & Steel Co., Baltimore. The plant, which has been remodeled throughout and is now capable of producing annually 7,000 tons of high class bridge and structural work, will be enlarged and the capacity more than doubled. The works are on the main line of the Baltimore & Ohio R. R. and at a convenient point for foreign shipment. A large amount of material is in stock and the company is in a position to make prompt delivery. Mr. Nathaniel Haven, President, was for more than 15 years identified with the Union Bridge Co., and Mr. Alfred M. Moss crop, Vice-President and Manager, was for some time connected with the Rochester Bridge & Iron Works.

Interlocking.

The Philadelphia & Reading is to install a new interlocking plant of 36 levers at Norristown, Pa., and one of 56 levers at Bridgeport, Pa. In both cases the contract is given to the Pneumatic Signal Company, of New York and Chicago.

More Low-Pressure Interlocking and Block Signals in England.

The London & South Western has contracted with the British Pneumatic Signaling Company, Ltd., for the installation of automatic signals for a distance of 24 miles on the South Western main line. It is stated that the contract for the installation includes eight pneumatic interlocking plants, averaging 70 levers each, and 31 sets of automatic signals to be erected on bridges over the four-track road. For the purposes of automatic signaling this portion of the line will be divided into sections of 3,000 ft. each. The London & South Western will thus be the first road in England to use automatic and power signaling on so large a portion of main line. The installation between Andover and Grateley has been already described.

Interlocking at St. Enoch's Station, Glasgow.

In six cabins recently put up by The W. R. Sykes Interlocking Signal Company at this station there are both mechanical and electrical apparatus. The plants, very extensive, are described in the *Railway Engineer* (London) for September, 1902. In the six cabins there are 196 mechanical levers and 590 electrical; 38 of the mechanical and 99 of the electrical being spare. The switches are worked by manual power and the signals by electric. The largest cabin has 88 mechanical and 400 electrical levers. At the station (head-house) there are 40 double shunt signals, any one of which may be used to give two indications, one by dropping the arm to the right and one by dropping the arm to the left. In this way, 173 signals serve for 240 operations. Extensive use is made also of "route levers" for simplifying the interlocking. Diagrams are given showing the construction of the shunting signal and of Sykes' detector bar; also of

the electric motor for full sized semaphores. The shunting signal is a small semaphore arm centrally pivoted, within a circular frame, like the Gould-Tisdale signal of 1887. The electro-magnet for working this signal has an armature something the shape of Hall's. The detector bars are electrical. The bar stands normally level with the top of the rail (probably on inside of rail), and the pressure of the wheel on the bar, depressing it, opens an electric circuit, locking the lever in the cabin. To release a lever the signalman presses on a foot button, closing a circuit and unlocking the lever, provided the circuit is not open at the detector bar. The electric current at the six cabins is obtained from storage batteries which are charged only once in every three weeks, from the city mains. The cost of current for 10,000 train movements is 86 cents.

A Water Arch for Locomotive Fire-box.

Experiments are reported to have been made on the Montana Central Railroad with a water arch, the invention of Mr. C. E. Taber, Master Mechanic of the road. The device consists of a steel box, several inches deep, 4 ft. 8 in. long and a width corresponding to the distance between the side sheets of the fire-box. The arch is placed directly in front of the flue sheet and at an angle of 45 degrees. The feed water is forced into the arch at or near the bottom by the use of an injector and is delivered to the boiler from the extreme top of the arch by 2-inch pipes connecting the top of the arch to the flue sheet. It is stated that all mud and foreign matter will fall to the bottom of the arch, from where it is blown out by the use of a blow-off cock attached to the arch at the extreme bottom. To prevent the sheets from burning, a circulation is formed by the use of a circulating valve connecting the lower water leg of the boiler to the bottom of the water arch. The circulating valve is opened automatically by the weight of the water against the lower side or bottom of the circulating valve while the injector is idle, and is closed by the force of the water against the top side of circulating valve while the injector is working. An engine has been equipped with this arrangement and has made over 30,000 miles in freight service and has had the boilers washed out but three times. After making 12,000 miles scarcely any mud was found except on the mud ring where there was about 1½ in. of mud and loose scale.

Cylinder Lubrication.

The London branch of the Dixon Graphite Co. is exploiting a new cylinder lubrication. The lubricant is flake graphite mixed with high flash paint cylinder oil to form a thick paste. The mixture is introduced into a lubricator of special design, forcing the lubricating mixture through one or more pipes to the engine steam chest or cylinders. A speed-reducing gear is provided, driven by a narrow leather belt, or other means, from the crank shaft of the engine, so that the driving motion of the lubricator is operated upon only twice per minute. The length of the stroke of the driving motion can be varied to adjust the number of teeth engaged per stroke. The quantity of the mixture delivered to the engine per minute is under complete control, and once adjusted is constant and requires no attention. The lubricator and gear are quite simple, and can be fixed on any suitable part of the engine, or some distance away from the engine. The use of graphite is especially commendable with superheated steam, as it will stand the high temperature.

Another New York Tunnel.

The Hudson & Manhattan Railway Company was recently incorporated in New Jersey to build a tunnel in Jersey City, from the Erie Railroad terminus to the Jersey Central terminus. It is said that this will eventually be prolonged northward and connect with the old Hudson River tunnel, which is to be completed. We do not learn that work is likely to be begun soon.

THE SCRAP HEAP.

Notes.

A Wisconsin paper reports that the Northern Pacific has issued an order forbidding the agents of the company to employ their own relatives.

On Sept. 24 the Interstate Commerce Commission began hearings at Wichita, Kan., on various complaints originating in the city against the Atchison, the Illinois Central, the Rock Island, the Missouri Pacific and other roads.

The Philadelphia & Reading is to increase the number of electric lights in its yard at Reading, Pa., adding about 50 to the present 50. It is said that there has been an appreciable diminution in the number of accidents in the yard since it was lighted.

An officer of the Canadian Pacific says that the "Imperial limited," which has been run three times a week across the continent during the past summer, has done such a good business that the company thinks of running the train next summer every day.

The regulation of the Boston & Maine, requiring the holder's photograph and autograph to appear on season tickets, applies only to tickets costing \$50 or over quarterly. Besides the photograph, the ticket bears memoranda concerning the passenger's complexion and stature.

The Erie Railroad has established a suburban parcel delivery out of New York City. Adhesive stamps are sold, so that passengers sending parcels frequently can prepay the charges without sending money to the station with every shipment. The plan is similar to that of the New York, New Haven & Hartford between New York and

Stamford, except that the maximum limit of weight is 100 lbs. instead of 25 lbs., and that the business is done by Wells, Fargo & Co. and not by the railroad company directly. The rates, however, are based on delivery at destination at the station and not at houses.

At Ford City, Pa., on the night of Sept. 17, Carl Reichard, telegraph operator in the station of the Pennsylvania Railroad, shot and killed a man who came to the office window and covered Reichard with a revolver. Reichard was wounded. On the night of Sept. 21 thieves robbed the passengers in a sleeping car of the Missouri Pacific, running from St. Louis, Mo., to St. Joseph, securing, it is said, over \$1,000. On the same night a robber entered the express car of a train on the Pennsylvania road, between Emporium, Pa., and Renovo, and overpowered the messenger, but failed to secure any booty.

The strike of the conductors and motormen on the Hudson Valley (Electric) Railroad, in Saratoga, Washington and Warren counties, N. Y., appears to have been very ugly and persistent, though only a small number of men struck. Traffic was entirely suspended for more than two weeks, and when it was resumed the militia had to be called out to guard the cars. There was lawlessness of all kinds; bridges were burned, rails were loosened and tracks were greased. One deputy sheriff, acting as conductor, was arrested and imprisoned for shooting a boy during a riotous demonstration at Waterford. On Sept. 22 most of the lines were in operation, but not many passengers were carried.

Wabash Passenger Station in Pittsburgh.

It is said that the plans for the Pittsburgh passenger station of the Wabash, which will be at Liberty and Fourth avenues and Ferry street, are about finished. The work of preparing the ground for this new station, also for the entrance of the road into the Point district, was begun a few days ago. The company has permits from the Bureau of Buildings to raze quite a number of buildings for this purpose and this is the work now being done.

New Station for the Pennsylvania in Pittsburgh.

Pittsburgh despatches announce that the Pennsylvania will build a new station in that city at Fifth avenue and Smithfield street, just west of the new station recently finished. It will be devoted to local and suburban traffic principally.

The New Fore River Bridge.

The Fore River Ship & Engine Co., of Quincy Point, Mass., which has the contract to build the new drawbridge over the Weymouth Fore River at Quincy, has just put a temporary structure over the river. The new bridge, which is to be 660 ft. long, will have a draw span of 258 ft. with two openings 100 ft. each. There will be six approach spans each 68 ft. long, two spans being on the Quincy side of the draw and four on the Weymouth side. The bridge will accommodate a 30-ft. roadway and a 5-ft. sidewalk. Street railroad tracks will run along the south side of the bridge. Masonry will be used for the center pier and steel cylinders filled with concrete will be used to support the other spans.

The Traveling Passenger Agent.

[Address at Montreal Convention of Traveling Passenger Agents.]

Mr. Geo. T. Bell, General Passenger and Ticket Agent of the Grand Trunk, addressed the convention briefly, expressing regret at the disappointment the members had met with in having bad weather in Muskoka. The main object of such a gathering as this was educational. There was no use in having a traveling passenger agent at Washington, or Denver, or San Francisco, talking about Muskoka, or the River St. Lawrence, in behalf of his line, if the agent himself had never seen these places. The policy of the Grand Trunk was that the traveling passenger agents and every person interested in bringing people into Canada should travel over the Grand Trunk on every possible occasion. He had been with the Grand Trunk 24 years. He had been through a great rate war with his friend on the left (Mr. Kerr), and as a result of that clearing of the atmosphere they had got down to the basis that peace at almost any price is desirable in railroad affairs, and that standing shoulder to shoulder was the proper policy first, last and all the time. So long as he had any voice in the policy of the Grand Trunk he would be in favor of traveling passenger agents, general passenger agents and others in the passenger service riding free over the Grand Trunk line, because that was the only way they could be educated as they should be in the beauties of the country. Transportation men should not be ignorant of what they were offering to the people. They were in the commercial world. They sold transportation, and he had yet to hear of a successful business man who undertook to sell his wares without having seen them. Mr. Bell also made a reference to the ladies accompanying the members. He pointed out that the presence of ladies on such a trip was especially valuable, because their point of view was to some extent different from that of the men, and for this reason the educational work was greater, as the agents would have the benefit of the impressions gathered by the ladies. The agents, and through them the railroads, were thus doubly benefited.

The President of the Traveling Passenger Agents' Association for the ensuing year is Mr. F. E. Fitzgerald, of Los Angeles, and the Secretary is Mr. H. W. Landman, of Detroit. Mr. Ussher, of the Canadian Pacific, spoke at the second day's session, expressing sentiments similar to those of Mr. Bell.

Civil Engineers for the Navy.

Examinations will be held at New York and Chicago on Sept. 29, by a naval board, of candidates for admission to the Corps of Civil Engineers, U. S. Navy. The Board consists of Civil Engineers Frank T. Chambers, Fred Thompson, A. C. Lewerenz, George Mackay and Charles A. Wentworth. A meeting was held at the New York Navy Yard last week for organization and questions will be prepared by the Board. The examination at New York will be held at the Navy Yard by three members of the Board, and in Chicago it will be held at the Civil Service Commission room, Post Office Building, by the other two members.

Report of the Commissioner of Patents.

The Annual Report of the Commissioner of Patents, for the fiscal year ending June 30, 1902, about to be issued from the Government Printing Office, will show that during the last fiscal year there were received the following applications: For mechanical patents, 45,562;

for designs, 1,807; for re-issues, 139; caveats, 1,849; trade-marks, 2,460; labels, 1,020, and for prints, 270, the total number of applications being greater than during any previous year. There were granted 27,387 patents, including re-issues and designs, and 1,864 trade-marks, 750 labels and 163 prints were registered. The number of patents expiring was 20,335. The total receipts of the Office were \$1,491,538.85, total expenditures, \$1,329,924.63, leaving a surplus of receipts over expenditures of \$161,614.22. Congress last session provided 35 new examiners and three clerks to meet the increased business of the office, and the Commissioner now again urges the necessity of more space.

Reshipping a 13-Inch Gun.

The steel lining of one of the 13-in. guns on the battleship "Indiana" having become eroded, a new 13-in. gun will be shipped to New York from the Washington Navy Yard to replace it, the transfer being made by removing the top of the turret.

The Washington Filtration Bids.

Col. Miller, Corps of Engineers U. S. Army, in charge of the water supply of the District of Columbia, has reported to the War Department that the opening of bids for the filtration plant at Washington will be temporarily postponed "in order to take advantage of the most recent improvements in the construction and operation of filters and to avoid the possibility of subsequent modifications of contracts." New plans and specifications for the filtration plant are now being prepared.

Method of Testing Naval Ships.

The Naval Board of Inspection which conducted the recent trial trip of the battleship "Maine," recommends that larger stake boats be used in future for such trials, and says if they are not available much more accurate results in determining the speed will be obtained by standardizing the screws over a measured mile course and determining the speed during a four hours' run at sea by the number of revolutions of the main engine. The engines of the "Maine" were found in excellent condition and the ship sound and up to contract requirements, and her average speed was 18 knots. The board strongly urges that in future such trials be not held when ships are so far from completed, the large amount of unfinished work making it impossible to determine the value of the vessel in other respects than speed or to observe defects.

Irrigation of Western Lands.

Mr. F. H. Newell, of the U. S. Geological Survey and Chief Engineer of the reclamation service in connection with the irrigation of arid lands under the Congressional appropriation made last session, has returned to Washington after an extensive trip through the West. Mr. Newell, in an interview in the Washington Star, is quoted as saying that the land to be reclaimed is now worthless, but with water provided by storage at \$10 or \$15 an acre it will ultimately be worth \$40 to \$100 an acre. The land is to be disposed of in small tracts to actual settlers, and before entry is allowed the cost per acre for reclamation will be estimated and the settler required to repay the amount in ten annual instalments. If successfully administered the plan will result in the complete development of the West and make homes for millions of people. Much of the soil is very rich and with irrigation will support a population equal to that east of the Mississippi River. Mr. Newell returns to the West Oct. 1. Field parties are operating in 16 States and territories and the results of their examinations and surveys will be reported to Congress in December next. (June 20, p. 484, and July 14, p. 576.)

The Steel Situation.

Relief comes slowly to consumers of coke, although each week brings a new high record of output. Stocks are becoming burdensome in the Connellsville yards, but facilities for transportation show little improvement. The first effect is the increasing importation of pig iron, Great Britain alone sending 70,000 tons during August, while arrangements are now being made for remote deliveries. Steel is also coming in freely. German producers accepting orders at gradually advancing quotations. Estimates of the amount of tonnage on the books of the leading domestic concerns fall little short of five million tons, covering deliveries nine months ahead, while new contracts are constantly offered. The abnormal condition of this industry bears testimony to the unprecedented expansion of business in the United States.—*Dun's Review*.

Massachusetts Railroad Commissioners' Requirements for Electric Railroads.

The State Railroad Commissioners of Massachusetts have announced the following requirements as likely to be imposed when new electric railroads are presented to the board for approval:

"Every location must be accompanied by a plan showing the place in the highway to be occupied by the railroad (including turnouts), and by trolley poles. The plan should also give grades and street lines, and such other information as may be practicable.

"The following conditions should be attached to grants of location:

"1. Tie rails to be not less than 60 lbs. per yard in weight.

"2. Ties to be of suitable timber, not less 7 ft. in length, 6 in. thick, with 6 in. face, and spaced not more than 2 ft. on centers.

"3. The roadbed to be constructed with at least 18 in. of suitable ballast below base of rails and properly drained.

"4. When practicable the railroad to be continuously either on one side or in the center of the driveway, and separated from the driveway with a clearance from any obstruction of at least four and one-half feet on tangents and more in proportion on curves.

"5. The roadway independent of the railroad to be of sufficient width to properly accommodate other travel.

"6. Crossings of the railroad from one side to the other of the highway to be avoided; but if permitted, only with provision for proper regulation respecting the operation of cars and restriction of speed."

Plans must show the location of every pole so that abutments can have the opportunity of objecting.

Decreased Earnings of South American Roads.

Reports recently issued of 14 railroads in South America in the vicinity of Buenos Ayres, show that there is only one of these companies—the Bahia Blanca & North Western, whose earnings are considerably smaller than those of any other road reported—which does not show a decrease from the figures given for the same period last year. The period taken in some cases is for 10 weeks ending Aug. 10, and in other cases is from the first of January until the above date, and the decrease in gross earnings in some cases is very considerable, amounting in the case of the Buenos Ayres & Rosario to £141,057 for the year to date, and in the case of the Central Cor-

doba to £178,076 for the same period. Small increases are reported on seven of the lines, however, for the first week in August.

LOCOMOTIVE BUILDING.

The Pere Marquette has ordered 10 locomotives from the American Locomotive Co.

The Kansas City, Mexico & Orient, it is said, will soon place orders for new locomotives.

The Illinois Central is reported to have ordered 16 locomotives from the Rogers Locomotive Works.

The Southwestern Coal & Improvement Co. is having 36 locomotives built at the Baldwin Works.

The Fort Worth & Denver has ordered a 55-ton freight engine, rebuilt at the Hicks Locomotive & Car Works.

The Chicago, Burlington & Quincy has ordered 50 consolidation locomotives from the American Locomotive Co.

The Astoria & Columbia River has ordered two 50-ton moguls from F. M. Hicks, rebuilt at the Hicks Locomotive & Car Works.

The Atchison, Topeka & Santa Fe order reported in our issue of Sept. 19 should read American gages and American top safety valves.

The Duluth, Missabe & Northern order for nine locomotives, recently reported as building by the American Locomotive Co., calls for simple consolidations weighing 180,000 lbs.; weight on drivers, 164,000 lbs.; cylinders, 22 x 28 in.; drivers, 56 in.; straight top boiler with radial stays and working steam pressure of 180 lbs.; total heating surface, 2,550½ sq. ft.; 272 tubes of charcoal iron, 14 ft. 11 in. long and 2¼ in. outside diameter; fire-box, 121 in. long and 42¼ in. wide, to be built of fire-box steel; grate area, 355 sq. ft.; tank capacity for water, 5,000 gal.; coal capacity, eight tons. Special equipment includes Westinghouse air-brakes, Hammond open-hearth steel axles, Higginbotham bell ringers, Magnesia boiler lagging, National hollow brake-beams, cast-iron brake-shoes, M. C. B. couplers, Adams & Westlake headlights, No. 10 Monitor injector, Jerome piston rod and valve rod packings, Ashcroft safety valves, Leach sanding devices, Nathan sight feed lubricators, Ashcroft steam gages, Midvale 3½ in. driving wheel tires, McKee-Fuller steel truck wheel tires, chilled plate tender wheel tires and cast-iron wheel centers.

The Chicago, Lake Shore & Eastern order placed with the Baldwin Locomotive Works, reported in our issue of Sept. 19, for seven simple six-wheel switch and four consolidation engines, are for May, 1903, delivery. The switching engines will weigh 130,000 lbs. and have 19 x 26 in. cylinders, 51 in. drivers, straight boilers, with a working steam pressure of 180 lbs., 270 National Tube Co.'s tubes, 2 in. in diameter, 10 ft. 6 in. long; fire-box, 96 in. long and 33½ in. wide; tank capacity 4,000 gallons of water and eight tons of coal. The consolidation engines will weigh 174,000 lbs., with 160,000 lbs. on the drivers, and have 22 x 28 in. cylinders, 51 in. drivers, straight boilers, with a working steam pressure of 200 lbs.; 372 National Tube Co.'s tubes, 2 in. in diameter, 15 ft. 6 in. long; fire-box 96 in. long and 72 in. wide; tank capacity 7,000 gallons of water and 13 tons of coal. The special equipment for both classes includes: Westinghouse air-brakes, Keasbey & Mattison boiler lagging, National-Hollow brake-beams, Buckeye couplers, Star headlights, Ohio injectors, phosphor bronze journal bearings, U. S. piston and valve rod packings, Coale muffled safety valves, Leach sanding devices, Nathan sight-feed lubricators, Baldwin springs, Crosby steam gages, 3½ in. standard driving wheel tires, cast-iron tender wheel tires and steel wheel centers. Other specialties include: "Little Giant" blow-off cocks, Westinghouse friction draft gear, McCord oil boxes, Universal bearings and American balance valves.

CAR BUILDING.

The Mobile & Ohio is considering the purchase of some new equipment.

The Seaboard Air Line will order about 500 coal cars in the near future.

The Kansas City, Mexico & Orient, it is said, will soon place orders for new cars.

The St. Louis & Gulf is having 10 freights built by the American Car & Foundry Co.

The Chesapeake & Ohio has ordered 25 coaches from the American Car & Foundry Co.

The Lackawanna Iron & Steel Co. is having 59 freights built by the Pressed Steel Car Co.

The American Car & Foundry Co. has miscellaneous orders for 31 cars of various types.

The Atlanta & West Point is having 15 freights built by the American Car & Foundry Co.

The Terre Haute & Indianapolis is having 54 freights built by the American Car & Foundry Co.

The Lexington & Eastern has ordered two coaches and two cabooses from the American Car & Foundry Co.

The Bellington & Beaver Creek has ordered 42 box cars from F. M. Hicks rebuilt at the Hicks Locomotive & Car Works.

The Buckeye Cotton Oil Co. has ordered 20 box cars from F. M. Hicks, rebuilt at the Hicks Locomotive & Car Works.

F. M. Hicks has orders for 36 cars of various types for miscellaneous companies, rebuilt at the Hicks Locomotive & Car Works.

The Pullman Co. are bidding on 1,250 Caswell level-floor drop-bottom gondola cars of 80,000 lbs. capacity for February, 1903, delivery.

The Lake Shore & Michigan Southern is building 20 60-ft. baggage cars at its Cleveland shops instead of five, as reported in our issue of Sept. 19. These cars will have four-wheel steel frame trucks, with 5 x 9 in. journals, being duplicates of cars which they recently put in service, and are of their standard pattern.

The Vandalia placed an order Sept. 8 with the American Car & Foundry Co. for 54 coal cars of 80,000 lbs. capacity; length, 33 ft. inside; width, 8 ft. 4 in. inside; height, 44 in. inside, to be built of wood with wooden underframes. Special equipment includes P. R. R. specification axles, cast-steel bolsters, National hollow brake-beams, Westinghouse air-brakes, P. R. R. specification brasses, Tower couplers, Graham (wood) draft rigging, Company's standard (wood) dust guards, M. C. stan-

dard journal boxes, Davis journal box lids, P. R. R. specification springs, and American Car & Foundry Co. wheels.

BRIDGE BUILDING.

ARKADELPHIA, ARK.—The Levy Court will meet Oct. 6 to 10 and decide upon building a steel bridge over Owachita River. Address J. W. Wilson.

ATLANTIC, IOWA.—E. C. Pinkney, President of the Atlantic, Grant & Villisca (electric) R. R., says he will get bids Dec. 15 on two steel bridges for this road.

BROOKLYN, N. Y.—The Brooklyn Rapid Transit is considering extending its Nostrand avenue line, which will require a bridge over the tracks of the Long Island R. R.

CAMBRIDGE, ILL.—The bridge committee of the Rock Island County Board of Supervisors has been considering with a like committee of Henry County, sites for proposed bridges at Cleveland, Barstow and at Colona Station.

CANTON, OHIO.—It has been decided to get bids on Oct. 11 for the Linden avenue bridge. Wm. Reed, County Auditor.

CEDAR FALLS, IOWA.—The Chicago Great Western, we are told, will build a steel girder bridge over Dry Run in the south part of this town, the contract for which will be let with the rest of its bridge work next year.

CENTRAL FALLS, R. I.—Wm. F. Keene, City Engineer, writes that a new steel bridge of two spans, each about 90 ft., will be built over Blackstone River from Cross street, Central Falls, within the next year.

CLEVELAND, OHIO.—Local reports state that plans for abolishing the Detroit street grade crossings are soon to be finished and submitted to the city by the Lake Shore and Nickel Plate roads.

The Commissioners of Cuyahoga County want bids until Oct. 15 for building two culverts, according to plans on file with the County Surveyor, Wm. H. Evers.

DANVILLE, ILL.—Bids are wanted Oct. 3 by C. E. Ellsworth, County Surveyor, for building a 100 ft. steel bridge over Little Vermillion River.

DECATUR, ILL.—G. V. Loring, City Engineer, writes that the contract for the bridge over the branch of Stevens Creek at Decatur will be let at 10 a.m., Sept. 27.

GALESBURG, ILL.—There were quite a number of new bridges and repairs ordered at the last meeting of the Board of Supervisors. Address L. J. Burkhalter at Galesburg.

GALVESTON, TEXAS.—There is agitation in this city for another bridge over the bay.

GRAND HAVEN, MICH.—The Grand Rapids, Grand Haven & Muskegon Ry. has a franchise through Grand Haven and will build a free steel bridge on the road to Spring Lake, to cost about \$50,000.

GRANT, MICH.—Freeman F. Wetmore, County Drain Commissioner, writes that he will let contracts on Sept. 29 for eight small single-span steel bridges.

HARRISBURG, PA.—Bids for rebuilding 18 bridges in various parts of the State were opened by the Board of Public Grounds and Buildings on Sept. 23, and contracts for 17 of the structures were let at an aggregate cost of \$572,650. The bids on structures to cost more than \$40,000 are given here. The * indicates to whom contract was let.

Bowmanstown.—King Bridge Co., \$66,800; Nelson & Buchanan Co., \$64,700; William H. Gulic, \$66,100; Penn Bridge Co., \$64,900; York (Pa.) Bridge Co., \$65,800; *National Bridge Co., New York, \$63,900.

Honesdale.—King Bridge Co., Cleveland, Ohio, \$43,900; Nelson & Buchanan Co., Chambersburg, Pa., \$43,500; William H. Gulic, Phoenixville, Pa., \$52,000; Owego (N. Y.) Bridge Co., \$49,000; *Penn Bridge Co., Beaver Falls, Pa., \$40,745; Boston Bridge Works, Boston, Mass., \$49,986; York (Pa.) Bridge Co., \$49,000.

Tunkhannock.—King Bridge Co., \$145,000; Nelson & Buchanan Co., \$146,000; William H. Gulic, \$151,000; Owego (N. Y.) Bridge Co., \$157,000; *Penn Bridge Co., \$141,375; York (Pa.) Bridge Co., \$149,000.

White Haven.—*King Bridge Co., \$80,400; Nelson & Buchanan Co., \$83,500; William H. Gulic, \$85,600; Owego (N. Y.) Bridge Co., \$86,000; Penn Bridge Co., \$81,500; Boston Bridge Works, \$89,000; York (Pa.) Bridge Co., \$87,000.

The bridge at Tunkhannock, across the Susquehanna River, is the largest of the 18, having four spans, three being 199 ft. 1 3/4 in. long, and one 192 ft. 6 in. The next largest structure is that over the Lehigh River at White Haven. It will have four spans, one being 228 ft. 9 in., and three spans each 128 ft. long.

INDIANAPOLIS, IND.—Bids are wanted Oct. 8 for a bridge over Eagle Creek. Harry B. Smith, County Auditor.

JASPER, IND.—The Commissioners of Dubois County want bids Oct. 4, at the Auditor's office, for a steel bridge. A. H. Koerner, Auditor.

KANSAS CITY, MO.—It is said that the Missouri Pacific, the Chicago & Alton and the Metropolitan Street Ry. Co. and the city are considering building a viaduct from Guinotte and Lydia avenues at a probable cost of \$85,000.

LEWISBURG, PA.—The Grand Jury has approved of the erection of county bridges over Rapid Run near Hanselman's, and over White Deer Hole Creek in Gregg Township.

LEXINGTON, N. C.—Bids are wanted the first Monday in October by J. H. Lamberth, Chairman of the County Commissioners at Thomsville, for a bridge over Abbotts Creek.

MARYSVILLE, KAN.—The Commissioners of Marshall County want bids on Oct. 9 for seven steel bridges, the largest of which will be 100 ft. long. James Montgomery, County Clerk.

MISHAWAKA, IND.—Alonzo J. Hammond, City Engineer of South Bend, and Engineer for the proposed bridge over St. Joseph River at this place to be built by the county, writes that the County Council has failed to make the appropriation to begin this work, but it will probably appropriate the money in December. The total length of the proposed bridge is 380 ft., either steel or concrete, and the total estimated cost, \$50,000.

NEWARK, N. J.—Sanford & Harris, of Newark, have the contract to build the substructure of the Scherzer

rolling lift bridge over Newark Bay for the Central Railroad of New Jersey.

NEWKIRK, OKLA. T.—Bids are wanted Oct. 7 by the Board of County Commissioners for seven bridges, most of which are to be built of steel. Plans and specifications are on file with the County Clerk. C. V. Harris, Chairman, Board of Commissioners.

OSHKOSH, WIS.—Local reports state that the Chicago, Milwaukee & St. Paul and the Wisconsin Central Railroads are to build a joint bridge over Fox River.

PAOLI, IND.—The Board of Commissioners of Orange County want bids Oct. 6 for building two bridges. Plans and specifications are on file with the County Auditor. John H. Weeks, Commissioner.

PAOLA, KAN.—We are told that the Commissioners of Miami County will build a steel bridge about 200 ft. long over Polamatomee Creek. M. J. Roscoe, County Surveyor.

PAWTUCKET, R. I.—See Central Falls, R. I.

PEKIN, ILL.—The City Engineer has asked the Council to appoint a bridge engineer on building a 950 ft. bridge over Illinois River at this place.

PHILADELPHIA, PA.—The bids for the new intercounty bridge over Poquessing Creek, at Frankford avenue, were as follows: Henderson & Co., \$42,000; McCormick & Co., \$34,000; W. H. H. Achuff, \$27,900, and David Peoples, \$38,000. Achuff's bid was rejected because it was not accompanied by the customary bidding bond. Separate bids were received for the southern approach on the work in Philadelphia County, and these were Henderson & Co., \$6,700; McCormick & Co., \$2,857, and David Peoples, \$3,700.

Proposals were also opened for building the approaches and abutments of the bridge over the Schuylkill River at Passyunk avenue. These were as follows: Armstrong & Printzenhoff, \$39,390; David Peoples, \$23,937; Henderson & Co., \$49,777; McGraw & Gray, \$29,266, and the Hoffman Engineering Company, \$36,230.

PIEDMONT, MO.—The old suspension bridge over McKenzie Creek collapsed on Sept. 17, injuring several persons.

PITTSBURGH, PA.—The Council is considering ordinances for bridges as follows: Center avenue, \$30,000; Sawmill Run, \$12,000.

READING, PA.—The County Commissioners have requested the Comptroller to get bids on Oct. 1 for a bridge over the West Branch of the Perkiomen Creek in Washington Township.

Bids are wanted by John F. Ancona, County Comptroller, until Oct. 1 for building a bridge over Perkiomen Creek.

REDDING, CAL.—Alfred Baltzell, County Surveyor, writes that he has been ordered to make surveys, etc., for a bridge on Pitt River, and to report at the November meeting of the Board of Supervisors.

ROCKVILLE, IND.—Bids are wanted Oct. 8 at the office of S. A. Pike, County Auditor, for a steel bridge.

ROKEBY P. O., ONT.—L. Lindsay, of this place, with other commissioners, are to open bids on Oct. 2 for two steel bridges. Plans and specifications are to accompany bids.

ST. ALBANS, VT.—E. F. Fitzhugh, Vice-President and General Manager of the Central Vermont Ry., writes that the contract will be let at once for the steel bridge to be built over Barron's Pass at White River Junction, Vt.

ST. BERNARD, OHIO.—It is said that the local Board has permitted the Miami & Erie Transportation Co. to raise and strengthen the bridges over the canal from St. Bernard to the Butler County line. The canal company proposes to do similar work throughout the entire length of the canal.

SUREVEPORT, LA.—It was decided at the election on Sept. 15 to build a new bridge over Red River at Shreveport. F. W. Kane, City Engineer.

SOMERVILLE, MASS.—E. W. Bailey, City Engineer, writes that the bridges at School street and at Sycamore street are being built by the Boston & Maine R. R., and will soon be finished.

SPRINGFIELD, MASS.—The War Department has notified the Mayor of Springfield that the South End bridge across the Connecticut must be altered, either by raising the fourth span from the east end 15.5 ft., or placing a draw in the structure.

STOCKTON, CAL.—The Southern Pacific Co. has offered to build the drawbridge over Mormon Channel.

TRENTON, N. J.—The contract for building the Olden avenue bridge, Trenton, was awarded to the Berlin Construction Co. for \$20,300, including masonry.

VALLEY, NEB.—The citizens of Valley have appointed a committee to consult with the County Commissioners in regard to building a bridge over the Platte River west of Valley. The bridge will cost \$12,000, and the city has offered to raise \$5,000 of the cost.

WILLIAMSPORT, PA.—The extension of the Susquehanna & New York Railroad from Towanda to Binghamton, N. Y., will mean a large bridge at Towanda.

Other Structures.

BUFFALO, N. Y.—The New York Central has filed plans with the city for a new freight shed to be built alongside the Hamburg Canal near Washington street. It will be a brick structure costing \$10,000 and will replace the structure recently burned.

EL PASO, TEXAS.—The El Paso-Rock Island Route is considering building a new station in El Paso, but nothing definite is decided.

JONESBORO, ARK.—The St. Louis & San Francisco has under consideration building a new passenger station at Jonesboro, but has made no decision in the matter.

KANSAS CITY, MO.—The Metropolitan Street Ry. has bought four acres of ground near Bush Creek, where it will build new car barns.

MEMPHIS, TENN.—The Illinois Central will soon receive new bids for building the new shops in South Memphis.

Mr. Winchell, Vice-President and General Manager of the St. Louis & San Francisco, is reported as saying that his company is ready to join with the Gould roads in building a union station in Memphis. Mr. Winchell also said that considerable changes will be made in the tracks and sidings on his road in Memphis, and that the company will put up a new brick building 100 x 250 ft., which

will be used as a machine shop and engine house. The company will also build a new office building for the Master Mechanic and will convert the present round-house into boiler shops. Plans and specifications for all of this work are now ready and bids will be asked in a few days. This work will cost about \$150,000.

OMAHA, NEB.—The Union Pacific has taken out building permits for a brick storehouse 50 x 288 ft., to cost \$50,000; also for an oil house to cost \$12,000.

PAINESVILLE, OHIO.—It is said plans are being made by the Baltimore & Ohio for a new car building and car repairing shop to be located at Painesville. It is said there are to be two main buildings, each 240 ft. long and 90 ft. wide.

PORTSMOUTH, OHIO.—Local reports state that plans for the new Norfolk & Western shops at Portsmouth are finished and that work will be begun soon. It is said the plans provide for a boiler shop 304 ft. long by 72 ft. wide; machine shop 248 ft. long by 72 ft. wide, and a planing mill 120 ft. long by 72 ft. wide. There will also be a boiler room 40 ft. x 48 ft., and an oil house 20 x 50 ft.; also store room and office building and a 40-stall engine house.

RACINE, WIS.—The Milwaukee Electric Railway & Lighting Co. will build a new power house at a cost of \$100,000. It will be a brick and stone structure, the ground dimensions being 74 x 143 ft.

SAULT STE. MARIE, ONT.—F. W. Wheeler, of Bay City, Mich., and F. H. Clergue, of this place, are said to be considering locating a ship yard at the "Soo." It is also said that an addition is to be made to the steel mill to make splice bars.

VANCOUVER, B. C.—The Canadian Pacific, it is said, contemplates spending many hundreds of thousands of dollars at Vancouver this fall. It is said the work will include five wharves, large warehouses, coal docks and grain elevators.

WICHITA, KAN.—The plans for the Kansas City, Mexico & Orient shops at Wichita are reported finished.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad associations and engineering societies see advertising page xvi.)

Southern & Southwestern Railway Club.

At the meeting held in Atlanta on Aug. 21 a committee composed of F. A. Healy, N. L. Menhinney and John A. Steel submitted a report on "Best Forms for Shop and Storekeepers Reports." The report was read by Mr. Healy. Mr. McKee was to report at this meeting on the subject, "Vanderbilt Fire-Lox and Tender," but failed to attend the meeting.

Railway Club of Pittsburgh.

A regular meeting of this club was held at the Hotel Henry, Pittsburgh, Pa., at 2 p.m., Friday, Sept. 26. Discussion was held on Mr. C. L. Gist's paper "The Car Record Office." After the adjournment the members were to inspect the works of the Keystone Car Wheel Co. at Hays Station, and be entertained by a series of tests, and shown the method of making wheels. A paper on this subject will be discussed at the October meeting.

Rocky Mountain Railway Club.

The Rocky Mountain Railway Club held its opening monthly meeting for the new term, 1902-03, Saturday, Sept. 20, at 7:30 p.m., at its assembly room, second floor, Union Depot, Denver. The following papers published in the April proceedings were discussed:

"Do Lifting Injectors Receive Proper Attention?" by W. H. Wallace, B. & M. R.

"The Importance of Maximum Loading of Cars," by G. W. Covert, B. & M. R.

Discussion on Dr. Von Schrenk's treatise on the "Preservation of Timber," is postponed until the October meeting, when the professor will be present.

Southern Railroad Commissioners.

A meeting of the Southern Railroad Commissioners' Association will be held at Hot Springs, Ark., on the 14th of October. It was resolved by the meeting at Asheville to invite members of commercial organizations and railroad officials to be present at this meeting, and commissioners are requested to invite such organizations and officials. The members of the Association are the railroad commissioners and secretary of each State. President McChord (Kentucky) has appointed Capt. J. D. McInnis, of the Mississippi Commission, as chairman of the committee on the classification of expenses of operation and construction of railroads, and Secretary Webb (Mississippi) is also made a member of the committee.

The Engineers' Club of St. Louis.

The 547th meeting was held at the rooms of the club, 709 Pine street, on Wednesday, Sept. 17, at 8 p.m. There were present 21 members and 4 visitors. The Prize Committee submitted a report, which was accepted. Upon motion the chairman was instructed to appoint a committee to revise the rules governing the award of an annual prize so as to eliminate the feature of a gold medal. The chairman appointed Mr. Roper on this committee. The chairman then introduced Mr. Burt Cole, who read a paper on "Bituminous Coal Mining in Illinois." For the year ending July 1, 1901, there were 915 mines in operation in Illinois, employing over 44,000 men and boys and mining about 26,000,000 tons. The death rate from accident was about 2.2 per one thousand employees, or one death for 260,000 tons. Nearly 60 per cent. of the deaths are due to falling rock, coal or slate. Coal is mined by two general systems: the long-wall and the pillar-and-room system. The long-wall system requires thin veins, an elastic roof, and considerable refuse; it mines about 90 per cent. of the coal. The system is used in a few mines in the northern part of the State. The pillar-and-room method is the more common method, but mines only about 50 per cent. of the coal. This system of mining was described in considerable detail. By means of lantern-slides, surveys of mines using this system were shown, and the method of ventilating described. Mechanical haulage is rapidly replacing mule haulage along the main entry. The endless rope, tail rope and electric systems of haulage were described. A number of machines for undercutting coal were illustrated and their use was explained. The methods of surveying were given in some detail, and the paper closed with a few remarks on the labor conditions. In the discussion which followed Messrs. Fish, Freeman, Barwick, Bansch, Russell and others participated.

The Superintendents of Bridges and Buildings.

The 12th annual convention of the Association of Rail-

way Superintendents of Bridges and Buildings will be held at West Hotel, Minneapolis, Minn., Oct. 21 to 23, 1902. A trip has been arranged for to Duluth and the Iron Ranges of Minnesota. It is understood that the Association will charter one or more Pullman sleepers, and the committee has arranged for free transportation for these sleeping cars from Minneapolis to Duluth, also for free transportation from Duluth to the Iron Ranges and return via Duluth & Iron Range Railroad, and the Duluth, Missabe & Northern Railway.

The committees and the subjects for report and discussion are:

1. Auxiliary coaling stations; best designs, capacity, and method of handling coal. W. A. McGonagle, Duluth, Missabe & Northern Ry., Duluth, Minn., Chairman.

2. Roof coverings, first cost, life, efficiency, and maintenance expenses for various classes of railroad buildings. E. Fisher, Missouri Pacific Ry., Pacific, Mo., Chairman.

3. Mail cranes, first cost, efficiency, and maintenance of various styles in use. A. S. Markley, Chicago & Eastern Illinois R. Co., Danville, Ill., Chairman.

4. Best method of protecting low, overhead structures over tracks from gases and blast locomotives. G. W. Andrews, B. & O. R. R., Baltimore, Md., Chairman.

5. What has been the experience in the use of concrete under bridge bed-plates and turn tables in place of pedestal stones, and what is the best form and material for bed-plates under various styles of iron bridges? W. A. Rodgers, Chicago, Ill., Chairman, 1203 Manhattan Building.

6. Best design and recent practice in building railroad pile-driver. B. F. Pickering, Boston & Maine R. R., Sanbornville, N. H., Chairman.

7. Best material and designs for roundhouse pits, including drainage and rail fastenings. Arthur Montzheimer, C. & N. W. Ry., Milwaukee, Wis., Chairman.

8. Best materials for wearing surface of roadway of highway bridge floors. W. O. Eggleston, C. & E. R. R., Huntington, Ind., Chairman.

Committee on Subjects.—Walter C. Berg, Lehigh Valley Ry., New York City, Chairman.

Visits will be made to the flouring mills, Government dam at Meekers Island, Fort Snelling, Minnehaha Falls, and other points of interest.

PERSONAL.

—Mr. James A. Semple, a veteran railroad Passenger Agent, died at his son's home in Denver Sept. 15, aged 67 years.

—Mr. Henry E. Day, Chairman of the Florida Railroad Commission, has resigned and has accepted a position with the Seaboard Air Line Railway as City Agent at Jacksonville. Mr. Day has been succeeded by Mr. E. H. Furre. Mr. Day has been a member of the Commission since 1897, and Chairman since 1899. His resignation takes effect the first of October.

—Mr. F. F. Whittekin, of Tionesta, Pa., has been appointed Director General of the Government system of railroads in Colombia, and will sail for South America shortly to take charge of the department over which he will preside. Mr. Whittekin has spent many years in Colombia, is well known there and will be welcomed back by his many friends in Government circles at Bogotá and the Departmental Capitals throughout the Republic.

—Col. H. R. Stoughton, an officer of the Central Vermont at Barre, died suddenly at Otsego, Mich., on Sept. 17. Col. Stoughton was born in Quebec and was 66 years old. He began his railroad service with the Central Vermont at the age of 17. He served in the Civil War, participating in many engagements; and for several years about 1880 he was General Manager of the Shelby Iron Company in Alabama, but returned to Vermont about 12 years ago, and had been with the Central Vermont practically all his life with these two exceptions.

—Major John W. Powell, Director of the United States Bureau of Ethnology, died at his summer home in Haven, Me., Sept. 23. Major Powell was born at Mt. Morris, N. Y., in 1834. He was graduated from the Illinois Wesleyan, taking the degrees of A. M. and Ph. D.; he received the degree of LL. D. from Columbian, Harvard University and the Illinois College, and Ph. D. from Heidelberg. He served through the Civil War with the Second Artillery, reaching the rank of Major. One of Major Powell's most notable scientific works was his exploration of the Grand Canyon of the Colorado River in 1869. He was appointed Director of the Bureau of Ethnology in 1879, and was Director of the Geological Survey from 1880 to 1894. His writings include numerous reports on his explorations in the West and studies in Sociology, etc.

—Mr. Archibald A. Schenck, who recently succeeded Mr. Marsh as Chief Engineer of the Fremont, Elkhorn & Missouri Valley, was graduated from the Lawrenceville Academy and Princeton University. He began engineering on the Pennsylvania in 1872. Mr. Schenck served one and a half years on the construction of the Callowhill Street Bridge, Philadelphia, and two years as Assistant Engineer of the Fourth United States Light House District, Sandy Hook to Cape Henlopen and Delaware River. For three years he was Assistant and Principal Assistant Engineer of the Boston, Hoosac Tunnel & Western, which now is a part of the Fitchburg. He resigned from this company to go with the West Shore, where he remained one and a half years. He then went with the Oregon Railroad & Navigation Company as Resident Engineer and was for a time connected with the Canadian Pacific. In 1885 he became Chief Assistant Engineer of the New Jersey Junction and two years later was appointed Chief Engineer of the Oregon & Pacific, a line about 140 miles in length in western Oregon, but this project was afterwards abandoned. Mr. Schenck was for several years connected with the New York Central & Hudson River as Chief Assistant Engineer. During 1899, and until August, this year, he was Division Engineer of the Chicago & North Western. He was afterwards transferred to the Chief Engineership of the Fremont, Elkhorn & Missouri Valley, which practically constitutes the Chicago & North Western west of the Missouri River and covers, with extensions, about 1,400 miles of road.

ELECTIONS AND APPOINTMENTS.

Baltimore & Ohio.—W. H. Williams, heretofore Assistant Secretary, has been appointed Assistant to the General Manager.

Canadian Pacific.—The headquarters of W. B. Bulling, Assistant Freight Traffic Manager of the Eastern Lines, have been removed from Montreal to Toronto.

Cape Breton.—M. E. Evans has been elected President and G. E. Johnson, Secretary and Treasurer.

Chesapeake Western.—A. S. Weisiger, General Freight and Passenger Agent, with headquarters at Harrisonburg, Va., has resigned.

Chicago, Rock Island & Pacific.—The position of division accountant has been created and the following ac-

countants have been appointed: E. E. Wallace, H. G. Galbrant and B. H. Demoling.

Cincinnati, Indianapolis & Western.—The officers of this company are: President, M. D. Woodford; Vice-President, Henry F. Shoemaker; Secretary and Treasurer, F. H. Short; General Manager, C. G. Waldo; Freight Traffic Manager, A. H. McLeod; Passenger Traffic Manager, D. G. Edwards; General Freight and Passenger Agent, J. S. Lazarus; Purchasing Agent, George R. Balch; General Superintendent, R. B. Turner; Superintendent of Car Service, G. H. Waldo; J. L. Orbison, Superintendent of Telegraph; R. D. Marshall, General Counsel; George H. Graves, Superintendent Springfield Division, and W. C. Shoemaker, Superintendent of the Indianapolis Division.

Knorrville, La Follette & Jellico.—J. E. Willoughby has been appointed Chief Engineer.

Lake Erie, Alliance & Wheeling.—C. O. Scranton has been appointed General Freight and Passenger Agent, with headquarters at Alliance, Ohio. F. B. Everett has been appointed Auditor at Alliance.

Louisville & Nashville.—The headquarters of L. M. Hill, Superintendent of Dining Cars, have been removed from Louisville, Ky., to Nashville, Tenn.

Missouri Pacific.—J. H. Abbott, heretofore Division Engineer of Maintenance of Way of the Baltimore & Ohio, has been appointed Division Engineer of the M. P., with headquarters at Buffalo, Ark.

New York Central & Hudson River.—W. J. Frapp has been appointed Assistant Superintendent of the Mohawk Division, with headquarters at Albany, N. Y., effective Sept. 22.

New York, New Haven & Hartford.—W. Skinner and D. Newton Barney have been elected Directors, succeeding Henry S. Lee and L. Brainard, deceased.

Pacific Coast.—Frederick C. Ambridge has been appointed General Auditor, with headquarters at Seattle, Wash., succeeding J. F. Lawless, promoted.

Pittsburgh, Shawmut & Northern.—R. A. Billingham has been appointed General Master Mechanic, with headquarters at St. Mary's, Pa., effective Aug. 23.

Seaboard Air Line.—C. R. Capps, General Freight Agent, has been appointed to take charge of the freight traffic and C. B. Ryan, General Passenger Agent, to take charge of the passenger traffic.

F. P. Hickey has been appointed Division Master Mechanic, with headquarters at Raleigh, N. C.

Union Pacific.—F. M. Marsh, heretofore Chief Engineer of the Fremont, Elkhorn & Missouri Valley, has been appointed Assistant to the Chief Engineer of the U. P.

Western Maryland.—M. L. Harden has been appointed Assistant Master of Machinery, with headquarters at Hagerstown, Md., succeeding H. E. Passmore, resigned.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

ADENA (WHEELING & LAKE ERIE).—Grading is reported in progress for 12 miles on this new line, which is to run from Adena, Ohio, in Jefferson County, to St. Clairsville Junction in Belmont County, where connection will be made with the Baltimore & Ohio, a total of about 21 miles. (Construction Supplement, March 14, 1902.)

ATCHISON, TOPEKA & SANTA FE.—An officer writes that during the next 12 months it is intended to relay 165 miles of main line with 85-lb. rails. A part will be done on each of the Albuquerque, Arizona and Southern California divisions. (Sept. 5, p. 695.)

ATLANTIC COAST LINE.—Surveys are reported completed from Punta Gorda to Fort Myers, Fla., 25 miles.

ATLANTIC, GRANT & VILLISCA (ELECTRIC).—This is the correct name of the company referred to in our issue of Sept. 12 as the Atlantic, Villisca & Grant. An officer writes that surveys are completed and contracts will be let immediately. The road runs along the public highway between the points named in Iowa, a distance of 36 miles, and involves two steel bridges, one of which will be 25 ft., and the other 43 ft. long. Bids will be asked for rails and rolling stock on Dec. 15. The road will be operated by electricity, but by some other system than the trolley. E. C. Pinkney, Atlantic, Iowa, is President. (Sept. 12, p. 715.)

AUBURN-SYRACUSE (ELECTRIC).—Contract has been let to the Westinghouse Electric & Mfg. Co. for power house equipment for this new line now building between Auburn and Syracuse, N. Y., 25 miles.

BESSEMER & LAKE ERIE.—Contract for a new line from Branchton, on the Hilliard branch, to Grady's Bend, on the Allegheny River, 20 miles distant, is reported let. The new line will open up valuable coal territory.

BLACKSTONE & SOUTHERN (VA.).—A railroad 15 miles long to connect Blackstone, Va., with the Seaboard Air Line at McKinney is projected. H. H. Seay, of Blackstone, is interested.

BUFFALO & SUSQUEHANNA.—Incorporation was granted a branch 85 miles long in New York on Sept. 22. The proposed line will run from Wellsville to Buffalo, through Allegheny, Wyoming, Cattaraugus and Erie Counties. The capital of the extension is \$10,000,000, half of which is non-cumulative 4 per cent. preferred, and half common. The directors are Frank H. Goodyear, Chas. W. Goodyear, Wilson S. Bissell and others, of Buffalo. An officer writes that surveys have not as yet progressed sufficiently so that any detailed information can be given. (Sept. 12, p. 715.)

CALIFORNIA ROADS.—It is said that work will begin soon on a railroad from Oroville to mines in Butte County. The road will probably be a narrow gauge owing to sharp curvature. The project in view is the mining of several miles of the river bed of the North Fork in the interest of the North Carolina Gold Mining Co. Surveys have been made.

CHESAPEAKE & OHIO.—It is said that the Piney branch will be extended to coal fields near Prosperity, W. Va., in the near future.

CHESAPEAKE WESTERN.—It is said that surveys have now been made for this projected line to within eight miles of Gloucester Point, Va., the projected terminus.

It is intended to run from Gloucester Point, York Harbor, Va., northwest and west, taking in the 27 miles of the former Chesapeake & Western line now being worked in the Shenandoah Valley, and running through 100 miles of the West Virginia coal fields to a point near Parkersburg, W. Va. On May 14 miles of this line between Stokesville and Bridgewater, Va., connecting with the Chesapeake & Western, was opened and work is in progress on the greater part of the entire project. It is commonly supposed that this line is associated with the endeavors of the Goulds to obtain a tidewater terminal.

CHICAGO, INDIANAPOLIS & LOUISVILLE.—An officer is quoted as saying that work will begin in the early part of 1903 on an extension 85 miles long from Indianapolis to Linton, Green County, Ind.

CHICAGO, ROCK ISLAND & TEXAS.—Contract is reported let to Craney Bros. for an extension from Fort Worth to Dallas, a distance of about 30 miles, and it is said that work will begin at once.

CHICAGO, ROCK ISLAND & PACIFIC.—Contract was let on Sept. 13 to the W. R. Stubbs Co. to build a new line from Versailles, Mo., to Kansas City, a distance of about 120 miles, which it is estimated will cost about \$3,000,000.

The Watonga extension between Watonga and Anadarko, Okla. T., was opened on Sept. 13 between Watonga and Hinton, a distance of 39 miles.

CHOCTAW & CHICKASAW (CHICAGO, ROCK ISLAND & PACIFIC).—This company was incorporated in Oklahoma Sept. 17 to build 200 miles of extensions for the Chicago, Rock Island & Pacific. The first of these will run south through the Chickasaw Nation to a point between Coalgate and Tishomingo; the second from Milburn, Ind. T., through the Chickasaw Nation to Sherman, Denison or Dallas, Texas, and the third from Wilburton, Ind. T., to Howe, Ind. T., near Fort Smith, Ark.

CINCINNATI, HAMILTON & DAYTON.—Surveys are reported for an extension from Gallia furnace to Marion, Ohio.

COPPER RANGE.—Work is reported in progress on two branch lines, one to the Baltic mine and the other to the Baltic mill in Michigan. An extension is also building under contract to C. J. Johnson, of Minneapolis, to Lake Linden, Laurium, Calumet and Red Jacket, a distance of about 18 miles. It is said that this branch will be completed before the first of next year.

DALLAS, CLEBURNE & SOUTHWESTERN.—Grading and bridge work on this new line between the points named in Texas is reported completed between Cleburne and Egan, 10 miles, and it is said that track laying between these points will be finished by the middle of October. The total projected distance is about 50 miles, and it is said that the whole or a portion of the line has been leased by the Missouri, Kansas & Texas, and will be worked as a part of that system. (Aug. 1, p. 615.)

DENVER & RIO GRANDE.—According to most recent advices, 25 miles of the North Fork branch running northeast from Delta, Colo., has been completed and contracts have been let for an additional 21 miles to Paonia and adjacent coal fields. It is said that the line will be finished and ready for business by Nov. 1. Work on the Castle Valley cut-off on the line of the Rio Grande Western was begun last spring. Surveys and location were completed and the contract was let for 21 miles. This line will run from Farnham, on the main line, to Salina on the Marysville branch, 116 miles, and when completed will afford a route 38 miles shorter than the present one to southwestern Utah, opening up important coal fields. Work on the line will be done from time to time, according to the requirements of the various classes of traffic which it is believed can be developed. During the year a considerable amount of grade and alignment changes on the Rio Grande Western, and of standard gaging on the Denver & Rio Grande was done. (Official.)

FORT WORTH & RIO GRANDE (ST. LOUIS & SAN FRANCISCO).—Grading is reported about half completed on the extension from Brownwood to Grady, Texas, and surveys have been made to San Antonio, which is about 175 miles from Brownwood.

HECLA BELT.—Work is reported well under way on this new line in Michigan, which was incorporated last April to build about 20 miles in Bay County to reach cement works and coal mines. Grading is being done by Peter Peterson. (April 25, p. 316.)

HUDSON & MANHATTAN.—This company was chartered in New Jersey Sept. 19, with an authorized capital of \$100,000 to build a railroad to commence at Pavonia Ferry, Jersey City, running thence southerly to a point at or near the intersection of Exchange Place and Hudson street, in said city, and thence under the Hudson to a convenient point on the boundary between New Jersey and New York, thence connecting with the railroad of any company now or hereafter organized under the laws of the State of New York. The tunnel will run from a point at or near the intersection of Exchange Place and Hudson street, thence southerly and under Hudson street to the southerly terminus thereof, and from thence southerly to a point at or near the depot of the Central Railroad of New Jersey. The directors are Albert C. Wall, of South Orange, and Clarence Kelsey and others, of Jersey City, N. J.

HUATUSCO.—This road, which is being built from San Luis Potosi, Mexico, to a point in the Huatusco Valley, will, it is said, be completed within the next six months. If present plans are carried out, the road will eventually be over 200 miles long. It is being built by a syndicate of Mexican capitalists, of which Julio Llamantores, a prominent Mexican banker, is at the head.

KANSAS, OKLAHOMA CENTRAL & SOUTHWESTERN.—Territorial charter was granted this company at Guthrie, Okla. T., on Sept. 16, to build from Cedarville, Kan., southwest through Stillwater, Guthrie and El Reno, Okla. T., to Kirkland, Texas, with two branch lines. The total projected length is 640 miles.

LOUISVILLE & NASHVILLE.—An officer denies current reports that the Providence branch, now terminating at Providence, Ky., will be extended to Shawneetown, Ill., about 40 miles distant.

MENA & BLACK SPRINGS.—Articles of incorporation were filed by this company in Arkansas Sept. 17 to build from Mena to Black Springs in Montgomery County, a distance of 35 miles. The incorporators are Day Mills, Pittsburgh, Kan.; John T. Todd, of Mena, Ark., and others.

MEXICAN CENTRAL.—Contract has been let to Hampson & Smith for 45 miles of track between Tuxpan, Mexico and Colima. The work involves 13 tunnels and 17 bridges, and the estimated cost is \$3,500,000. This same line was built as far as Tuxpan last fall from Guadala-

jara, in the State of Jalisco. Through connection to Manzanillo will be made from Colima.

MEXICAN INTERNATIONAL.—New surveys are reported for a branch line between Porfirio Diaz, opposite Eagle Pass, Texas, up the valley of the Rio Grande, to the town of Las Vacas, Mexico, opposite Del Rio, Texas, a distance of about 75 miles. Surveys are also being made for an extension south from Durango to Mazatlan crossing the Sierra Madres. A number of preliminary surveys for this latter line have been made during the last few years. (May 30, p. 404.)

MEXICAN NATIONAL.—An officer is quoted as saying that a branch line from Monterey, Mexico, to San Miguel, on the Rio Grande Border, will be begun about the end of the present year. The Mexican National at present owns an isolated piece of road running between San Miguel and Matamoros, Mexico, the latter place being directly opposite Brownsville, Texas. The length of this line is 75 miles, while the entire distance between San Miguel and Monterey is 145 miles. The new line will be standard gage. (July 25, p. 600.)

MICHIGAN ROADS.—Two new lines have been surveyed to Sault Ste. Marie, and it is said that they will both be built early next year, with a possibility of work being begun this fall. One runs from St. Ignace in connection with the Grand Rapids & Indiana, and the other is to be built from Detroit in connection with the Detroit & Mackinac. (Sept. 12, p. 715.)

MISSOURI, KANSAS & OKLAHOMA (MISSOURI, KANSAS & TEXAS).—For account of this new line now building in Indian Territory and Oklahoma, see review of annual report. (Sept. 19, p. 726.)

MISSOURI, KANSAS & TEXAS.—The annual report states that the management has recently entered into the most important building work which has occupied its attention for some years, by taking steps to maintain its



hold upon the region in the Indian Territory west of the main line, which has recently been invaded by extensions of the Chicago, Rock Island & Pacific, the Atchison, Topeka & Santa Fe and the St. Louis & San Francisco. There has been considerable pressure brought by the citizens of Oklahoma and the merchants of St. Louis and Kansas City, to induce the management to extend the Coffeyville branch from Stevens, Ind. T., to Oklahoma City, which line will not only afford the shortest route to Chicago and points beyond, but will strengthen the strategic position of the Missouri, Kansas & Texas in a section of the country where the greatest developments are now going on. The accompanying map shows the new lines which will accomplish this, aggregating about 275 miles. These lines are now building. A further extension southeast from Oklahoma City to a junction with the Coalgate branch has also been projected with a view to opening up new markets for coal.

MORGANTOWN & KINGWOOD.—It is said that the line will be extended from Reedsville, in Barbour County, W. Va., to Belington, 30 miles, crossing the Baltimore & Ohio near Thornton. Geo. S. Sturgiss, of Morgantown, W. Va., is President of the company which has built about 12 miles of road up to the present time.

NEWTON & NORTHWESTERN.—Articles of incorporation were filed in Iowa Sept. 20. It is proposed to absorb the Boone, Rockwell City & Northwestern, formerly known as the Marshalltown & Dakota, which was built from Fraser to Gowrie, Iowa, a distance of 21 miles, and to build northwest from Gowrie to Rockwell City, and southeast from Fraser to Newton, involving 80 miles of new line. Hamilton Browne, of Boone, Iowa, is President, and S. R. Meserve is Vice-President.

PENNSYLVANIA.—Contract is reported let for double-tracking the Cambria & Clearfield Division between Ebensburg and Cresson, Pa., 11 miles. Curves are also to be straightened and the grade improved.

QUEEN ANNE'S.—Preliminary surveys are reported completed from a point near Hobbs Station, Md., to Chincoteague, Va., about 120 miles. The estimated cost of this line, if built, will be about \$2,500,000. The Queen Anne's is now in operation between Queenstown, Md., and Rehoboth, Del., 66 miles, making connection with Baltimore by a ferry route 38 miles long across Chesapeake Bay and connecting at Rehoboth with a line to Cape May by way of ferry across Delaware Bay. Wm. H. Bosley, Baltimore, Md., is President.

QUINTANA RIO-CITAS.—A new line between these points in the State of Chihuahua, Mexico, was opened Sept. 1. It is currently reported that it has become a part of the Kansas City, Mexico & Orient.

SAN JERONIMO.—A large force is reported at work on this projected line between the town of San Jeronimo, on the Isthmus of Tehuantepec, and the Guatemala border. If this road is completed as planned, it will be 250 miles long and will be an important link in the so-called Pan-American road. Connection is made at San Jeronimo with the National Tehuantepec, and the promoters have obtained a concession from the Guatemala Government at the other terminus for continuing the road through that country, touching at a number of important towns in the interior.

ST. LOUIS VALLEY.—See under Missouri Pacific, Railroad News department.

SOUTHERN PACIFIC.—It is said that the surveyors who have been engaged since last spring in finding a tunnel route for the Central Pacific through the Sierra Nevada mountains, have laid out a line which calls for a tunnel 34,800 ft. long, which will enable the company to get rid of all but three miles of snow sheds, cut down the grade 1,500 ft., and permit of straightening the approaches through each end of the tunnel. This is part of the plan for reducing time between San Francisco and Chicago.

SUSQUEHANNA, BLOOMSBURG & BERWICK.—Work was begun on this new line in Pennsylvania Sept. 13. It is proposed to build from Bloomsburg to Berwick, Pa., by a route which will be about 20 miles long, and building is to be pushed as fast as possible. S. B. Haupt, Watertown, Pa., is General Manager. (Sept. 5, p. 696.)

TALLAHATTA.—It is said that about 10 miles of this new lumber road in Mississippi are now ready for track laying. The line as projected runs from a point on the Alabama & Vicksburg, east of Chunkey, Miss., to Philadelphia in Neshoba County, and to Louisville in Winston County, Miss., a distance of about 65 miles. S. R. Rounds, of Lauderdale, Miss., and R. W. Meehan, of Milwaukee, Wis., may be addressed. (July 4, p. 544.)

TENNESSEE CENTRAL.—Contract for the projected branch line from Clarksville, Tenn., to Hopkinsville, Ky., has been let to W. J. Oliver, and it is said that work will be begun as soon as the surveying corps has completed the location. (June 20, p. 486.)

TEXAS SHORT LINE.—It is said that this line, which has recently been completed between Grand Saline and Hoyt, Texas, 10 miles, will be extended north to Pittsburg, Texas, a distance of 50 miles, connecting at the latter place with the St. Louis Southwestern. A southern extension from Grand Saline to Corsicana, 65 miles, is also contemplated. Henry M. Strong, of Grand Saline, is President, and R. S. Weitzell, of Weatherford, Texas, is Chief Engineer. (Aug. 29, p. 682.)

WABASH.—Contracts have now been let for the Pittsburg, Carnegie & Western for the completion of engineering and building work, so that it is expected that trains will be running into Pittsburg by the first of June, 1903. A large force of men is now reported at work on the stretch between Mingo Junction, on the Ohio River, and Pittsburg, a distance of 38 miles.

GENERAL RAILROAD NEWS.

ATCHISON, TOPEKA & SANTA FE.—An increase in the capital stock of the Eastern Oklahoma branch of the Oklahoma Division has been certified from \$2,200,000 to \$10,000,000. It is said that the plans of the company involve building about 330 miles of road in Oklahoma. Work was reported completed last July from Pawnee to Ralston, Okla. T., 18 miles.

BEAR LAKE & EASTERN.—Sale of the equipment of this line is reported, and it is said that the rails, etc., will be removed during the present year. The road is about 16 miles long and has been worked for lumbering between Pierpont and Springdale in Manistee County. It was built in 1887 and had practically no passenger traffic.

CANADIAN PACIFIC.—Notice is given that in pursuance with the provision for retiring the 5 per cent. land grant bonds, the whole of the remaining bonds not heretofore called in are now called. Each bond will be redeemed at a premium of 10 per cent., plus accrued interest, provided it be presented at the Treasurer's office in Montreal within 60 days of the first notice, which appeared on Aug. 28, but if not so presented, no interest will be payable for the period after the said 60 days.

CHICAGO, ROCK ISLAND & PACIFIC.—Attorney-General Mullan, of Iowa, in an opinion filed with the Governor Sept. 16, holds that the acts of the new Iowa corporation of the Rock Island, in connection with the reorganization, are not outside the powers conferred by statute nor contrary to public policy, in the legal sense of the term. The Governor in making public the opinion, concurs in it from a legal point of view, but adds: "The thing done is neither a merger nor a consolidation. Not a mile of track nor a dollar in value is added to the Rock Island property. It is simply a new device for watering securities. It is for the next general assembly to say whether it is wise to permit our laws to so remain that such things are possible."

The Attorney-General says in his opinion: "The most serious problem involved is whether the State may interfere to prevent the issuance of the stocks and bonds of the Iowa and New Jersey companies, for the reason that the aggregate amount thereof proposed to be issued exceeds the market value of the stock of the Chicago, Rock Island & Pacific Railway Company, which the Iowa Company receives therefor; or whether it may by quo warranto have a forfeiture of the charter of the Iowa company declared on the ground that such an act is ultra vires and against public policy." He holds that it is clear that in the absence of a statutory provision to the contrary a corporation may issue its stocks and bonds for the purchase of property, although the face value of the issue is in excess of the actual value received. The public policy of the State must be determined by the judicial decisions of the State and not by the opinion of individuals, no matter how eminent. "Tested by this rule," he says, "the Acts of the Iowa incorporation cannot be said to be opposed to the public policy of the State."

CINCINNATI, NEW ORLEANS & TEXAS PACIFIC.—In the annual report just issued President Spencer gives a short account of the present status of the Cincinnati Southern lease. Proposition was made in February, 1901, by the Cincinnati, New Orleans & Texas Pacific to extend the lease of the Cincinnati Southern, expiring in 1906, until 1906, the annual rental for the first 26 years to be \$1,050,000; for the second 20 years to be \$1,100,000, and for the third 20 years to be \$1,200,000. Under the terms of the present lease the rental to be paid for the last five years from Oct. 12, 1901, to Oct. 12, 1906, is \$1,250,000, and it was proposed to pay this rate up to July 12, 1902, after which the excess of rent above \$1,050,000 to Oct. 12, 1906, was to be extended for approximately 21 years at the rate of \$40,000 per annum. It became necessary that the proposition should also be approved by the trustees of the sinking fund of the city of Cincinnati. President Spencer says: "The contract for the modification and renewal of the lease was submitted to the vote of the qualified voters of Cincinnati at the regular election held in November, 1901, and was approved by a vote of about three to one. A few days thereafter a petition was filed praying for an injunction to restrain the

Trustees from executing the contract and renewing the lease upon the agreed terms. The petition was dismissed by the Superior Court on Feb. 7, 1902, but an appeal was taken to the Supreme Court of the State. The Supreme Court affirmed the decision of the lower court, making valid the proposed extension of the lease, and also of the issue of bonds of the city for terminals and improvements as provided for in the supplementary agreements. These contracts were executed by the Trustees of the Cincinnati Southern, and by the Trustees of the Sinking Fund of the City of Cincinnati on June 7, 1902. Additional improvements must now be made for which there is great need, but the cost could not have been reasonably or safely incurred until the tenure of the lease was assured." The work includes renewal of bridges to admit of heavier rolling stock, etc., and will be spread over a series of years. Plans are now being made.

DULUTH, SOUTH SHORE & ATLANTIC.—The report for the year ending June 30, 1902, shows a surplus of \$20,327, following on a deficit of \$30,421 in 1901, and of \$4,110 in 1900. In 1899 there was a small surplus. Gross earnings for the current year were \$2,690,569, as against \$2,484,210 last year, and expenses increased during the period from \$1,554,931 to \$1,688,818. Total income for 1902, \$1,008,036, as against \$829,279 last year. Interest and taxes this year were \$987,709; in 1901, \$859,700. On June 1 the company commenced operating its own sleeping cars, having added five of these to its equipment during the year. The general balance sheet June 30, 1902, shows outstanding common stock to the amount of \$12,000,000; preferred stock, \$10,000,000; bonds and income certificates, \$23,000,000, and car trust notes, \$346,566. Below are statistics of operation.

	1902.	1901.
Miles worked	574	585
Main. of way and structure	\$451,055	\$421,389
Maintenance of equipment	228,566	227,649
Conducting transportation	933,262	931,760
General expenses	75,935	74,132

Total	\$1,688,818	\$1,654,931
Passengers carried	581,668	552,345
Passenger-miles	32,816,802	28,896,517
Tons of freight	2,311,464	2,391,654
Ton-miles	139,431,327	121,260,191
Av. amount per ton per mile, etc.	1.1	1.2

FITCHBURG.—At a meeting of shareholders Sept. 24 it was voted to issue \$2,600,000 of bonds to retire outstanding bonds of the Fitchburg and of the Vermont & Massachusetts maturing in 1903, and also to provide for betterments to the property, as agreed in the lease to the Boston & Maine. The directors are also authorized to request the Vermont & Massachusetts to issue its bonds to an amount not exceeding \$772,000, in accordance with the terms of its lease to the Fitchburg, to cover a portion of the cost of retiring Vermont & Massachusetts bonds maturing next year, and also of improvements upon the lines of the company made by the lessee.

GRAND TRUNK.—An officer denies current reports that the Detroit & Toledo Shore Line has been acquired by his company.

GEORGIA SOUTHERN & FLORIDA.—The eighth annual report just issued for the year ending June 30, 1902, shows gross earnings of \$1,250,876 as against \$1,203,811 in 1901. After deducting expenses of \$955,906, of which \$484,998, or almost half, was spent on maintenance of way, structures and equipment, there remains as net earnings from operation \$294,970, from which two semi-annual dividends of 2½ per cent. each were paid on the first preferred stock, and two dividends of 2 per cent. each were paid on the second preferred stock during the year. There is \$2,768,000 capital stock outstanding, or \$9,712 per mile of main line. The total funded debt outstanding is \$3,801,000, or \$13,337 per mile for the 285 miles of road, making a total capitalization of only \$23,049 per mile, with gross earnings for the year of \$4,389 per mile. The statistics of operation follow.

	1902.	1901.
Miles worked	285	285
Passengers carried	438,407	398,762
Pass. earnings per mile of road	\$1,587	\$1,511
Total revenue from passengers	\$452,335	\$430,695
Tons of freight	745,849	691,909
Freight earnings per mile of road	\$2,677	\$2,580
Total revenue from freight	\$762,840	\$735,435

MERIDA-VALLADOLID.—Sale of this line for \$5,000,000, Mexican silver, is reported. It extends between the points named, in the State of Yucatan, a distance of about 110 miles. The name of the purchaser is not stated.

METROPOLITAN STREET (NEW YORK).—The State Railroad Commission has authorized a first consolidated mortgage for \$3,000,000 by the Central Crosstown road. It is said that no bonds will be issued at once under the mortgage, which will provide for electric equipment of the tracks of the company, and for the retirement of outstanding bonds.

MISSOURI PACIFIC.—An officer is quoted as saying that the St. Louis Valley Road will be taken over as soon as the details of building and a few other matters have been arranged, as a part of the Missouri Pacific-Iron Mountain system. The St. Louis Valley was incorporated in Illinois in March, 1901, to build from East St. Louis south to Cairo, 146 miles. It is reported completed as far south as Chester, Ill., 65 miles, and is building as far as Thebes, Ill., 60 miles additional. Wm. E. Duy, of St. Louis, is General Manager. (See under Railroad Construction, July 25, p. 600.)

NORTHERN PACIFIC.—Announcement is made that this company has taken over the Everett & Monte Cristo, which extends between Hartford Junction, on the Northern Pacific, and Monte Cristo, Wash. A portion of the line has previously been under lease to the Northern Pacific for some time. The road was built by John D. Rockefeller about 10 years ago as an outlet to the Monte Cristo Mining Co.

SOUTHERN.—J. P. Morgan, Charles Lanier and G. F. Baker, voting trustees, announce in reference to their circular of Aug. 27, asking for an extension of the voting trust until Oct. 15, 1907, in the interest of negotiations now pending for the further development and strengthening of the company, that holders of a majority of stock trust certificates for preferred and common stock have agreed to such an extension either by having their stock trust certificates stamped assenting thereto, or by signing the extension agreement for stock trust certificates registered in their name. The time for presenting stock trust certificates to be stamped assenting to said extension, is extended until Oct. 1, 1902, and application has been made to the New York Stock Exchange to list stock trust certificates so stamped. (Sept. 5, p. 696.)